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Volume 2
Number 2
April 1984
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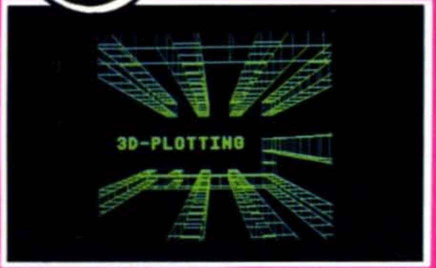
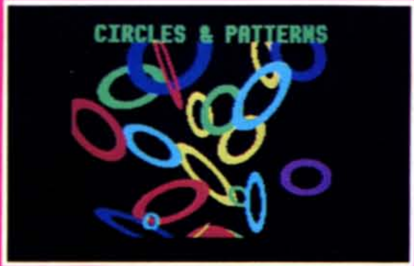
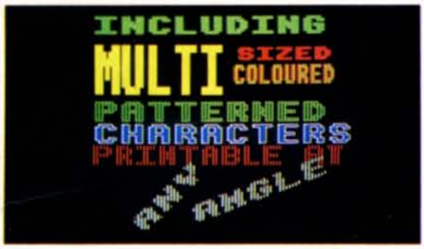
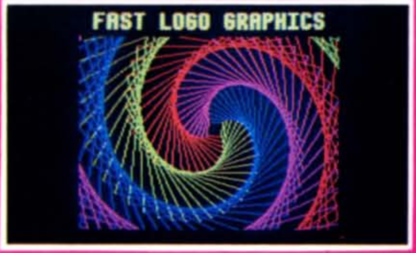
Graphics ROM









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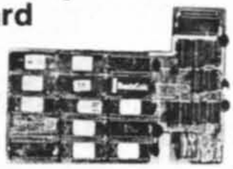

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Peter F. Brameld

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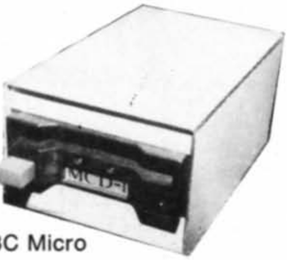

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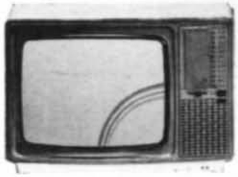

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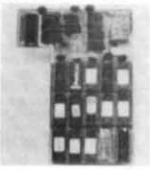

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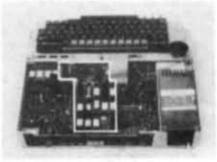

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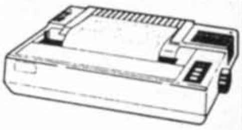

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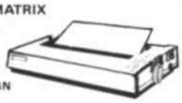

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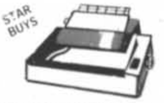

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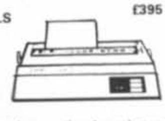

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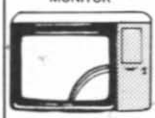

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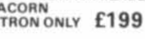

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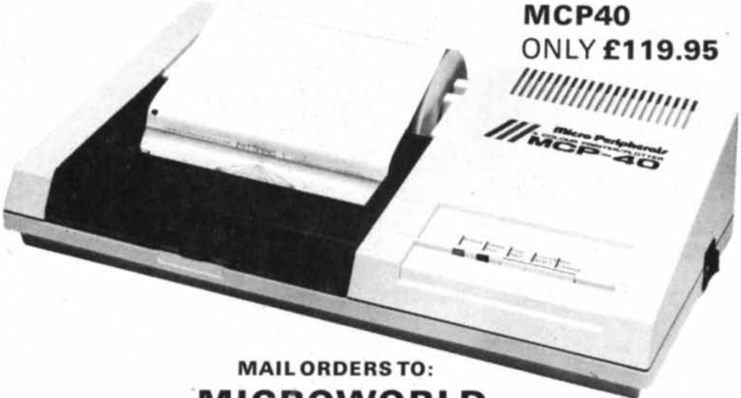

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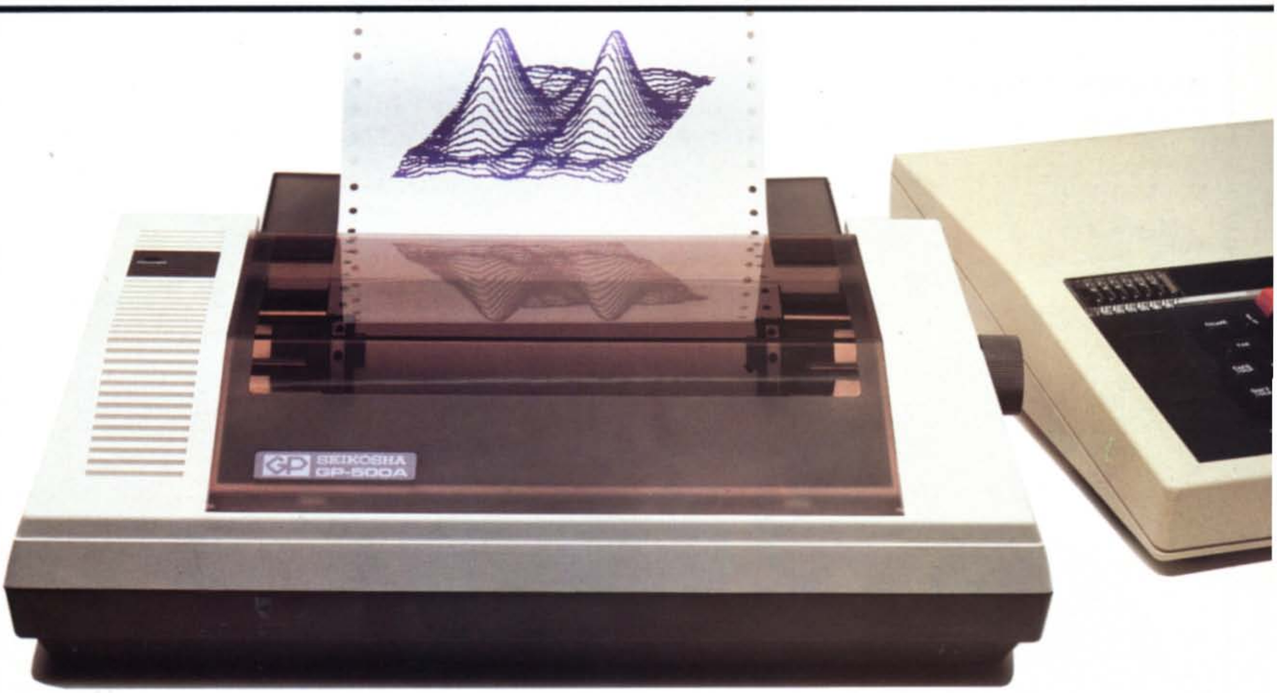

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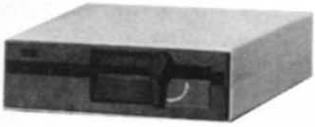

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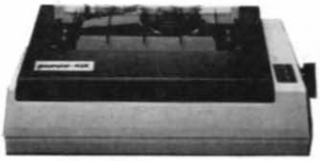

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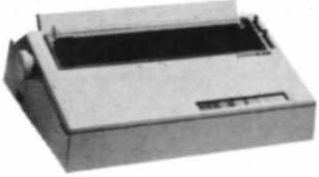

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All games for the BBC Micro 32K

MRM SOFTWARE

Also available on Micronet 800

Games for the Adventurous

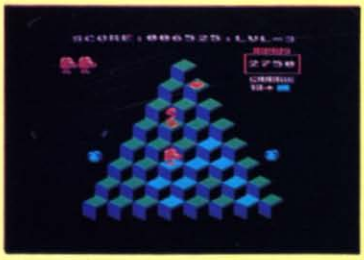
Secret Sam I No 5 on Micronet

You are Secret Sam. A top secret agent engaged upon a highly dangerous and confidential mission. In this intriguing adventure world of spies, counter-spies, double-dealers and espionage you must act swiftly but cautiously whilst searching for clues. Can you trust the agents that you meet? Have you all that's necessary to succesfully accomplish your deadly assignment?

Secret Sam II

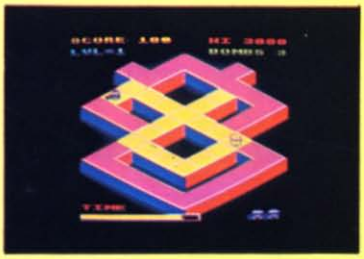
Following the success of his last mission – Sam is off once more on his journey into intrigue – tread carefully though for if you thought SAM I was dangerous your in for a shock! This really is an adventure game for the adventurous – be careful and mind how you go. Are the 'phone kiosks for changing into Superman? We're not saying but what we will say is "have the aspirins ready because this will certainly cause some headaches".

Q-MAN



The very popular 3D pyramid game. Hop around the pyramid avoiding the bouncing balls and Jake the Snake. A highly entertaining game with increasing difficulty plus our own totally unique features. Game includes TRANSPORT DISCS, BONUS, HIGH-SCORE TABLE, HYPERSPACE and SMART BOMBS. Excellent graphics and terrific sound. One of the three top selling games on MICRONET this month.

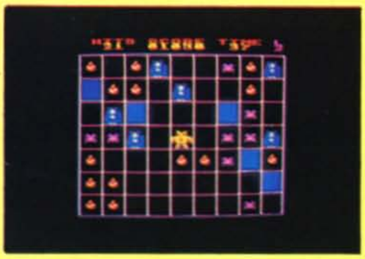
Q-MAN'S BROTHER



Q-MAN'S BROTHER is featured in the high score table of Q-MAN and now has his very own game. Have you time to paint all of the maze? Not if the PAINT POTS have anything to do with it or especially the deadly PAINT ROLLER which will erase all of your hard work! Increasing difficulty, excellent sound, AMAZING 3D graphics and high score.

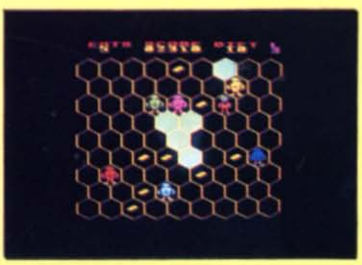
No 9 on Micronet

BANANA MAN



A totally new concept from MRM. You are the BANANA MAN and you must eat 40 BANANA SANDWICHES each minute to **stay alive. There are BLUE BLOCKS which may prevent you from** reaching the food and deadly PURPLE TARANTULAS that are fatal if stepped upon. ETHEL the CAT also appears but can be **scared away for mystery points. But watch out, she conceals a** spider. Features include BONUS BANANAS, BLOCK 'SHUFFLE', INCREASING DIFFICULTY, HIGH-SCORE TABLE and GREAT GRAPHICS.

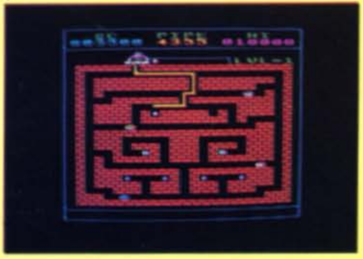
GUY IN THE HAT



You are THE GUY IN THE HAT entombed in a honeycomb labyrinth. Like BANANA MAN you have an increasing daily food diet, but this time your favourite snack is a BICKIE. Beware of the pursuing BICKIE BASHERS that are trying to ensnare you. Gain extra points by dropping your exploding hat and trapping the BICKIE BASHERS. Movement in 6 directions, HYPERLEAP and **menacing sounds are included along with the usual great** graphics and high-score table.

NEW RELEASE

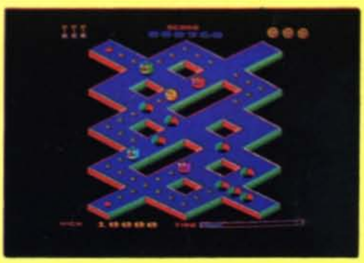
DIAMOND MINE



An absolutely fascinating and compulsive game designed to test your skills of dexterity and coordination. Steer the lengthening pipe to the diamonds buried deep in the depth of the diamond mine. But be careful avoid hitting the walls with the pipe and watch out for those monstrous menacing meanies . . . the bugs. Have you enough pipe left to collect all the diamonds? Have you got steady hands? Find out with this sparkling gem from MRM.

(Available on Electron) No 6 on Micronet

3D MUNCHY



A visually stunning version of the now legendary arcade classic . . . with a difference. Eat power pellets whilst avoiding the GHOSTS as usual, but can you get past the HOLES? Absolutely amazing graphics and sounds, increasing difficulty and high score. All this and you're battling against the clock as well. A CLASSIC from MRM.

No 1 on Micronet

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More Programs... m

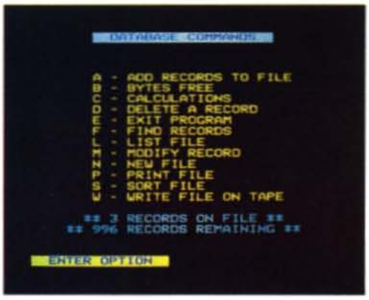
Gemini Serious Software

Database

The Gemini Database Management System is a program designed to enable the user to store all types of information in similar format to a card indexing system. The program will ask you for the headings under which you wish to store the information on a 'card', i.e. for a record collection database these might be 'Artist', 'Song', 'Composer', etc., or for example in a database set up for a business application, a set of headings could be 'Name', 'Age', 'Salary', 'Department', 'N.H.I. Number', etc.

Having set up your fields, you may then add information to the 'cards' under the headings you have elected. Gemini databases contain other important and useful utilities as well, e.g. alphabetical and numerical sorting, numeric calculations, finding records that meet specific requirements, line printer routines, browsing facilities, etc.

Strongly recommended as an invaluable program for home, business or educational requirements.

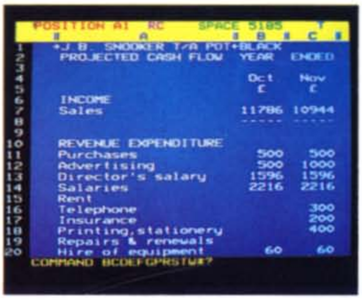


```
        DATABASE COMMANDS

        A - ADD RECORDS TO FILE
        B - BYTES FREE
        C - CALCULATIONS
        D - DELETE A RECORD
        E - EXIT PROGRAM
        F - FIND RECORDS
        L - LIST FILE
        M - MODIFY RECORD
        N - NEW FILE
        P - PRINT FILE
        S - SORT FILE
        W - WRITE FILE ON TAPE

       ** 3 RECORDS ON FILE **
     ** 996 RECORDS REMAINING **

  ENTER OPTION
```



```
POSITION A1  RC     SPACE 5185      T
   #          A           # B  # C  #
 1   *J.B. SNOOKER T/A POT*BLACK
 2    PROJECTED CASH FLOW  YEAR   ENDED
 3
 4                          Oct    Nov
 5                           £      £
 6    INCOME
 7    Sales                11786  10944
 8                         -----  -----
 9
10    REVENUE EXPENDITURE
11    Purchases              500    500
12    Advertising            500   1000
13    Director's salary     1596   1596
14    Salaries              2216   2216
15    Rent
16    Telephone                     300
17    Insurance                     200
18    Printing,stationery           400
19    Repairs & renewals
20    Hire of equipment       60     60
COMMAND BCDEFGPRSTW#?
```

Spread Sheet Analysis

Perhaps the most commercially successful item of business software yet written, the Spread Sheet processor offers a very wide range of invaluable calculation and editing features.

Consider, for example, a Cash Flow forecast containing rows and columns of figures, combined with text and numbers. If, say, the cash receipts for January need to be changed, it would normally be necessary to delete and re-calculate several figures for each successive month.

With SPREAD SHEET, however, an 'on screen' amendment to the January figure is made, and the corrected figures for each successive month automatically appear upon touching the 're-calculate' key.

Formulæ cells in the table may be specified which relate to each other and then copied RELATIVELY or ABSOLUTELY to other parts of the program, which in itself is modular, and directly linkable to other Gemini programs.

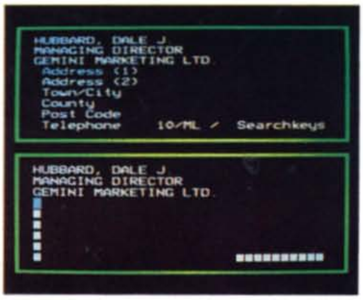
SPREAD SHEET has a complete range of inbuilt data entry and formatting techniques, and the structure of the table may be amended at any stage. Full printer facilities are included which allow for either the table to be printed or just the data and formulæ relating to the table. Another important feature, any valid BBC BASIC formula is acceptable as data entry making the system immensely powerful and versatile. The sister program GRAPHPLOT will take data from disk or tape files created by this program to provide data portrayal in graph, histogram or pie chart format.

SPREAD SHEET ANALYSIS - *"... Well documented, easy to load, excellent screen display."* — Home Computing Weekly.

Mailist

A superb dedicated database to allow for manipulations of names and addresses and other data. Gemini's unique 'searchkey' system gives you a further ten 'user-defined parameters' to make your own selections. Features include the facility to find a name or detail when only part of the detail is known, it will print labels in a variety of user specified formats.

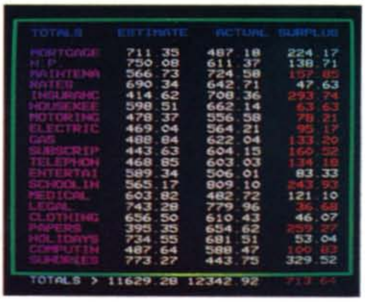
MAILIST - *"A very professional piece of software"* —Which Micro.



```
HUBBARD, DALE J
MANAGING DIRECTOR
GEMINI MARKETING LTD.
 Address (1)
 Address (2)
 Town/City
 County
 Post Code
 Telephone     10/ML /  Searchkeys

HUBBARD, DALE J
MANAGING DIRECTOR
GEMINI MARKETING LTD.
█
█
█
█
█
█                         ██████████
```

"Friendly and well designed - a pleasure to use - remarkable software." — The Scotsman



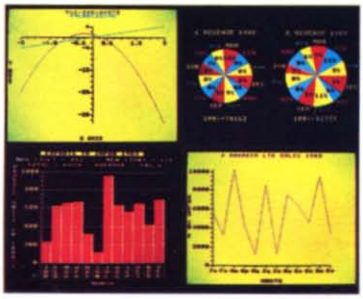
```
TOTALS      ESTIMATE    ACTUAL   SURPLUS

MORTGAGE     711.35     487.18    224.17
H.P.         750.08     611.37    138.71
MAINTENA     566.73     724.58    157.85
RATES        690.34     642.71     47.63
INSURANC     414.62     708.36    293.74
HOUSEKEE     598.51     662.14     63.63
MOTORING     478.37     556.58     78.21
ELECTRIC     469.04     564.21     95.17
GAS          488.84     622.04    133.20
SUBSCRIP     443.63     604.15    160.52
TELEPHON     468.85     603.03    134.18
ENTERTAI     589.34     506.01     83.33
SCHOOLIN     565.17     809.10    243.93
MEDICAL      603.82     482.72    121.10
LEGAL        743.28     779.96     36.68
CLOTHING     656.50     610.43     46.07
PAPERS       395.35     654.62    259.27
HOLIDAYS     734.55     681.51     53.04
COMPUTIN     487.64     588.47    100.83
SUNDRIES     773.27     443.75    329.52
TOTALS > 11629.28 12342.92        713.64
```

Home Accounts

Designed as a complete Home Accounting package this program allows the user to set up a budget for items of household expenditure and compare actual expenditure with budget. A running total of all surpluses and deficits is available both as digits, and in the form of a bar chart.

A complete Bank account routine is included together with suggested expenditure categories such as mortgage, rent, rates, telephone, gas, electricity, etc, however, these may be deleted or augmented without difficulty.



Graph Plot

Written specially for use with the BBC micro, this program makes full use of the high resolution colour graphics to provide an easily assimilated visual representation of numerical data.

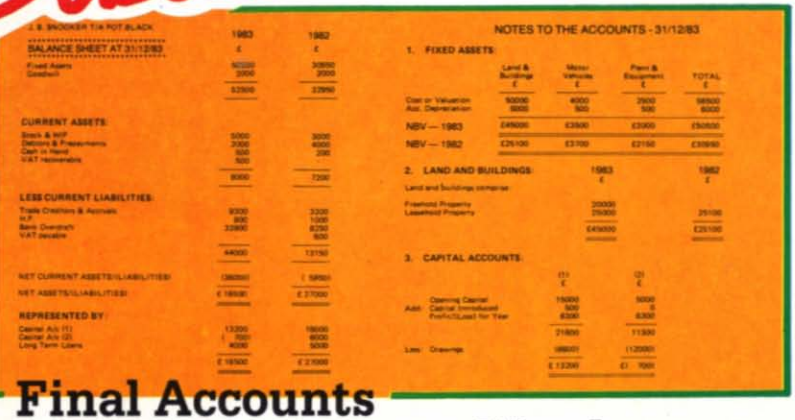
For example monthly sales statistics comparing two year's results may be instantly converted into two side by side pie charts, histograms or graphs... for easier visual comparison and assimilation.

GRAPH PLOT also incorporates a built in machine code screen dump, enabling a high resolution printed image to be produced using an Epson or similar bit image compatible printer. It also interfaces with other Gemini programs such as Spread Sheet Analysis and Cash Book and is particularly recommended where any kind of mathematical plotting facility is required.

GRAPH PLOT — *"Excellent displays with high resolution and good colour co-ordination"* — The Micro User.

ore Programs... more

Business Software



Final Accounts

Requires Cash Book module. This program will take your cash book data to the logical conclusion of balance sheet, trading and profit/loss account and notes to the accounts i.e. fixed assets, land and buildings and capital accounts. Interfaces with Graph Plot for graphic data presentation.

Invoices & Statements

This program greatly reduces the time and cost of preparing Invoices and Statements by storing essential information such as customer names, addresses and account numbers, VAT routines and footer messages such as 'Please remit by return', 'Overdue and outstanding', etc.

Not only are Invoices and Statements produced more quickly and accurately, but pre-printed forms for them are eliminated since the program produces professionally formated documents using your own printer.

Word Processor

This program provides many routines found in large and more expensive packages. With a typical word length of 5-6 letters it allows for up to 1000 words in memory at one time and is ideal for the user who wishes to write any kind of business letter on a home computer.

Features include, block delete, block insert, search and replace, edit text, display text, and many more.

Payroll

Managing the Payroll for up to 50 employees, this program is user friendly being menu driven, easy to use and supported by comprehensive documentation.

It shows gross pay, net pay and overtime for hourly, weekly or monthly paid employees, and holds most PAYE and NHI data together with essential SSP information.

Payrolls are automatically analysed under departmental heads and the most frequently used PAYE forms such as P14, P35 and P60 printed when required.

Stock Control

Dedicated software with all that's necessary to keep control of stock. This program will take the tedium out of stock control and save time and money. Routines include stock set up, user reference number, minimum stock level, financial summary, line print records, quick stock summary, add stock, delete/change record and more.

Easiledger

Contains routines to enable the small businessman to keep a record of one of the most important aspects of his business—cash flow.

EASILEDGER is essentially a debit/credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information. Its flexibility lies in its ability to produce account balances instantly for debtors and creditors, together with a record of all transactions, dates and references. A year-to-date summary of sales, purchases, receipts and payments over the twelve month period is also provided as is a complete INTERACTIVE bank account database.

EASILEDGER is a management aid software tool and is designed to run alongside an existing accounting system. If you operate a cash based business and require a complete accounting package to produce the accounts to trial balance and beyond then we recommend you consider using both the Easiledger and Cashbook programs together.

Cashbook

Gemini's CASHBOOK is a complete 'stand-alone' accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cash book system and provides a computerised system complete to trial balance.

Written by practising Chartered Accountants and coded by professional programmers, the system is practical, user friendly, and replaces manual cash and bank records. From sheaves of invoices and cheque book stubs, it will take you to trial balance and produce VAT summaries, Receipts and Payments analyses, departmental sales and purchases analyses, and a full audit trail.

Combination Packs

Designed to offer maximum value and convenience to the serious business or home user by combining several programs in one pack.

Combination Business Pack No. 1

Contains: Graphplot, Spreadsheet Analysis, Payroll, Cash Book, Final Accounts

	Normal list Price of programs in pack:	Combination Pack Price	SAVING... £
C.0113 BBC 32K Cassette	199.95	**159.95**	40.00
D.0113 BBC 32K 40 Track Disk	207.75	**159.95**	47.80
E.0113 BBC 32K 80 Track Disk	212.75	**159.95**	52.80

Combination Business Pack No. 2

Contains: Database, Stock Control, Word Processor, Mailist, Invoices & Statements.

C.0114 BBC 32K Cassette	99.75	**79.95**	19.80
D.0114 BBC 32K 40 Track Disk	119.75	**79.95**	39.80
E.0114 BBC 32K 80 Track Disk	124.75	**79.95**	44.80

Combination Business Pack No. 3

Contains: Database, Stock Control, Spreadsheet Analysis, Invoices & Statements, Mailist.

C.1615 ELECTRON	99.75	**79.95**	19.80

Combination Home Pack No. 1

Contains: Database, Home Accounts, Mailist, Spreadsheet Analysis, Graph Plot.

C.0116 BBC 32K Cassette	99.75	**79.95**	19.80
D.0116 BBC 32K 40 Track Disk	119.75	**79.95**	39.80
E.0116 BBC 32K 80 Track Disk	124.75	**79.95**	44.80
C.1616 ELECTRON	99.75	**79.95**	19.80

Combination Home Pack No. 2

Contains: Database, Home Accounts, Graph Plot, Mailist.

C.0417 SPECTRUM 48K	79.80	**59.95**	19.85

Available from most good software dealers and larger branches of WH Smith and Boots, or phone Gemini for immediate despatch quoting your Access, Visa or American Express card number. **Telephone (0395) 265165/265832** Alternatively send your cheque or Postal Order made payable to: **Gemini Marketing Ltd.**

Please send urgently: *BBC 32K/ELECTRON* (please delete)

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Please tick appropriate box. Prices include VAT and Post and Packing (UK only), for all programs on this double page, **except Cash Book, Final Accounts, Payroll, *and* Combination Packs.**

☐ Cassette *£19.95* ☐ 40 Tr disk *£23.95* ☐ 80 Tr disk *£24.95* ☐ 3" disk *£25.95*

CASH BOOK & FINAL ACCOUNTS *£59.95*
PAYROLL *£39.95*
} Same price for Cassette, 40 or 80 track disk or 3" disk—Please specify.

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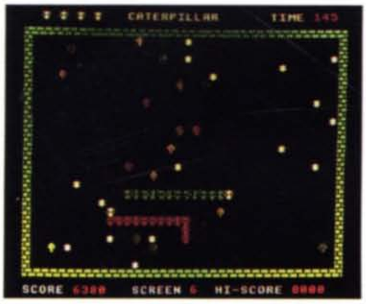


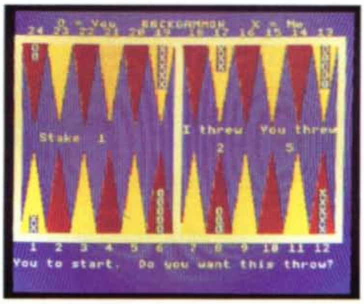
Caterpillar

C.0153 BBC 32K ***£9.95***

'Arnold' is a hungry caterpillar who has lost his way. His job is to eat all the lettuces in the garden and avoid the poisoned mushrooms. Bonuses are given if the allowed time for eating the lettuces is beaten and as the game progresses, more mushrooms and lettuces are added and the speed increases.

As you become more skilful at the game, a second caterpillar called 'Charlie' makes the game even more difficult since he must be avoided as well as the poisonous mushrooms if you are to avoid losing a life!

CATERPILLAR — "The game is well presented, playable and enjoyable" — Acorn User, Jan. 1984.



You to start. Do you want this throw?

Traditional Games

C.0156 BBC 32K & Electron ***£14.95***

Consists of ACCORDION, GIN RUMMY, PIQUET and BACKGAMMON (as illustrated).

Using the full potential of the BBC's colour graphics, these games allow the user to achieve a sound level of competence against a reasonably proficient opponent... THE COMPUTER!

The full and comprehensive manual, contains detailed rules for playing, plus hints on how to improve your play... until you can consistently beat the computer, at which point you should be ready to take on most players for modest stakes!

Gemini products are distributed by:
Computer Bookshop, Micro Dealer UK Ltd, Diamond Stylus PLC, Tiger Distribution, Wonderbridge Ltd, Ferranti & Davenport, Everyman Computers (NI), Websters Ltd, Lightning Records and Pilonmist Ltd.

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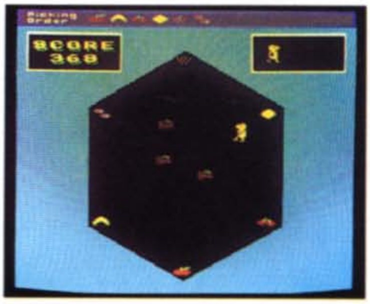
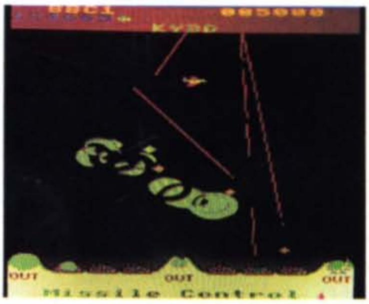


The Sting *C.0157 BBC 32K* ***£9.95***

A new release promising to be another all-time favourite. Collect the fruit in the correct order, but avoid the deadly wasp. Sometimes a spray is available to dispense with the unwanted insect, and a successful collection is rewarded with a bonus game requiring different tactics. Plenty of varied screens all with superb graphics. Exciting, innovative and highly recommended.



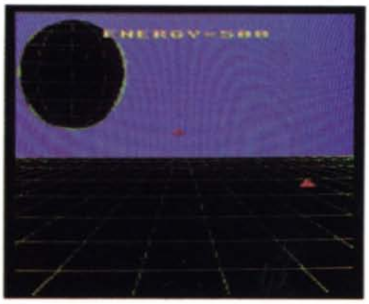
Missile Control

C.0150 BBC 32K C.1650 Electron ***£9.95***

Widely acknowledged by the trade and press as being the definitive version of this arcade classic for the BBC. Stunning graphics and as many screens as you can manage. Joystick or keyboard, 4 player option, smart bombs, planes, satellites, demo mode, hi-score; it's all in this one! Also available, completely re-written for Electron.

MISSILE CONTROL — "A brilliant game with good sound and graphics" — What Micro, Nov. 1983.

"A must for arcade action freaks..." — Acorn User, Jan. 1984.



Liberator

C.0152 BBC 32K ***£9.95***

Following the attack on your planetoid by the mutant raiders, you find that some hostages have been taken.

It is your mission to rescue these hostages, flying your new warp-ship.

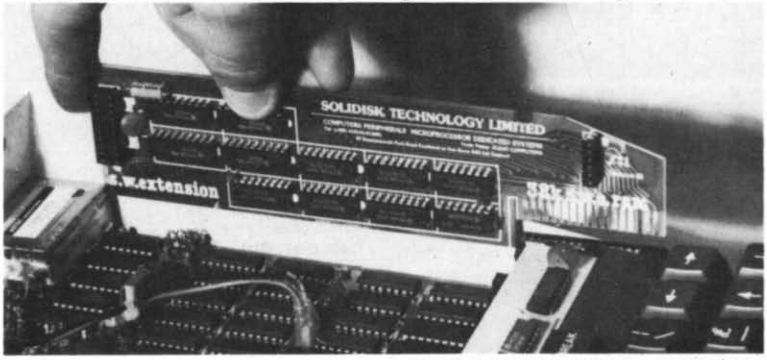
On coming out of warp-drive, you materialise over a flat plain which is covered with the mutants' power pyramids. To gain sufficient energy to rescue the hostages, you need to drain power from the pyramids with your photon blasters. BEWARE! The red pyramids blast back if you let them past your ship!!

Once the plains have been traversed, you enter a mountain tunnel, which in turn is followed by a defended valley. After the valley you can pick up the hostages with your transporter beam.

After a successful rescue, you safely deliver your people home and then set out on another mission... but this time the mutants are waiting for you!!

This game can be played with either a joystick or using the BBC keyboard.

The BBC-Sideways RAM System



The BBC Sideways RAM:
The most exciting add-on for the BBC micro, which many have been waiting for Acorn to produce!

What is the Sideways RAM?
The sideways RAM is a 16K (upgradable to 128K) memory board which fits into the rightmost ROM socket on your BBC micro. The sideways RAM is an essential piece of hardware for any BBC computer. Strategically integrated into the BBC system, the system CAN:

Answer definitively to shortage of Sideways ROM sockets:
The Sideways RAM is capable of running sideways system software such as languages, wordprocessor, electronic spreadsheet, etc.

Increase free memory for languages, add more entries to disk:
The sideways RAM can also be used to increase available memory by moving disk workspace into sideways RAM. PAGE is then set to the lowest possible value i.e. &0E00 thus rendering tape based software fully compatible with Acorn's disks. Furthermore, the disk directory is given extra space so that the maximum number of entries is increased from 31 to 154. Clearly, there is no way that other disk filing systems can offer such performance.

Increase text space for wordprocessor:
The Sideways RAM can also be used to increase effectively WORDWISE's text capacity from 24K to 32K or to a full 64K with the Silicon Disk. With the Sideways RAM system, you can create a whole chapter of a book in a single file! Machine code programmers using the Sideways RAM facilities are exceptionally favoured: the system can create assembly modules of up to 64K in size, up to 24K of space for labels and variables. A typical 8K machine code can be assembled in 2 minutes by BASIC, even directly to Sideways RAM.

Add a silicon disk to your computer:
If you have 128K of sideways RAM, part of it (112K) can be turned into a silicon disk. If you have a single drive, the system will address your floppy disk as drive 0 and the silicon disk as drive 1 (or 4 if you have 2 or more) but with a difference! The silicon drive has the capacity to load a 24K program faster than you can remove your finger from the 'RETURN' key with no clicking noise, no on/off LED, no wear. It can make you a backup floppy in 15 seconds from the original, proofread your wordprocessor texts nearly as fast as your own speed or re-create a relocatable, documented source code from an 8K ROM in minutes. The sheer speed of sideways RAM is absolutely ideal for programs like BEEBUG'S MASTERFILE (database applications), SPELLING CHECKER, VIEW (word-processing), Computer Concepts GRAPHIC EXTENSION (LOGO, Sprites etc.), BASIC, PASCAL, BCPL etc. Many other applications including games like ADVENTURE or CHESS will benefit from the ability of the Sideways RAM to make colourful 3D-graphic look like a movie picture or retireve any record in milliseconds. With the Solidisk fitted, the BBC outperforms most 16 bit machines.

Free software with every sideways RAM system:
The Sideways RAM comes already with lots of free software (on a 40 track single sided diskette). Sideways system software is free to all STL users, now and for future additions. All programs are given in basic source code and you are encouraged to personalise. Benevolent contributors will be rewarded with free hardware gifts. For example: 'STL0E00' and 'STL154' to set PAGE=&0E00 and allow 154 possible filenames, 'STLDISC' to create and maintain the SILICON DISK with extra commands like *FORMAT, *VERIFY and *DCOPY, 'WORD32' and 'WORD64' to increase text size for WORDWISE to 32K or 64K characters, STLASM to produce very large (up to 100K) assembly programs and a few other demonstration programs. Soon to be released: STLBASIC to run basic programs right in the Silicon Disk.

Increase the computer power by increasing sideways RAM:
The power of the BBC relies on its intelligent use of software where several sideways ROMs execute different tasks such as filing, calculating, drawing, processing, playing music, talking, compiling, debugging etc. The bigger the sideways RAM, the bigger the task the computer can handle.

Beautifully designed, easily installed, no soldering required:
The sideways RAM was first introduced and the first issue sold out at the ACORN USER SHOW (Sept. 83, London). The new issue has been exhibited at the PCW SHOW (Oct/Nov. 83, London), was on general distribution release at the BBC USER SHOW (Dec. 83, Westminster, London), reviewed by all major BBC micro magazines and user clubs and since then every week, hundreds of BBC users discover the convenience of the Sideways RAM system.
You can install it in 2 minutes and do not need to solder.
You can buy the 128K Solidisk now or a 16 or 32K Sideways RAM and upgrade it later if you needs grow.
Further upgrading is very simple: from 16K to 32K is by straight exchange (cost: £15 + p&p), from 32K to 128K is by plugging in the SOLIDISK extension (see figure 3) onto the 32K sideways RAM. It costs just £85 plus p&p.
You can also take advantage of the cheap hardware add-ons such as EPROM PROGRAMMER (£15) and EPROM ERASER (19.95) designed specially to compliment the sideways system.

Soon Available: Solidisk's Floppy Disc Systems:
STL also produce DISK PACKS which comprise all the necessary IC's, DFS ROM, manual, connecting cables, demonstration diskette in different storage capacities ranging from the basic 100K disc system to 1.8MB dual drive system. Both single density and double density are supported, fully compatible with ACORN disk system and the sideways RAM system. The choice of single or dual density is yours and there is virtually no difference in price.
SINGLE DENSITY DISK SYSTEM: based on the Intel 8271, the single density disk interface consists of a set of IC's to be added directly to the BBC board and is comparable to Acorn's disk interface upgrade. You choose 1 or 2 drives (up to 4 drives are supported), they are all half height units and usually come from TANDON, SHUTGUART, TEAC or CANNON with capacity ranging from 100K to 400K per drive (switchable). The single density disc system uses normal FM/IBM compatible recording technique, soft sectored 5¼"diskettes commonly available. Discs formatted with this system has 10 sectors of 256 bytes per track (2.5K bytes), a 40 track drive will offer 100K of storage using this system, a 80 track drive will offer 200K bytes and a double sided 80 track drive 400K, only 2 of the later can be used on the BBC. The real advantage of the single density disc system is neatness: the disc chip set goes neatly on the BBC board.
DUAL DENSITY DISK SYSTEM: based on the NEC 765A, the dual density disk system offers both single density and double density using MFM recording technique. The disc interface comprises a set of IC's and a small module plugging into socket 78. The advantage of the dual density disc system is the nearly twofold increased storage capacity with the same disc drive.
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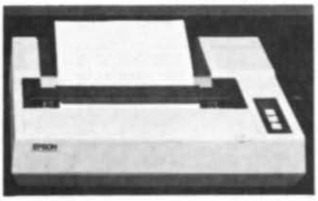

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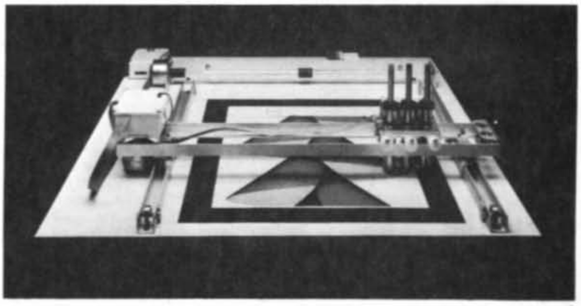

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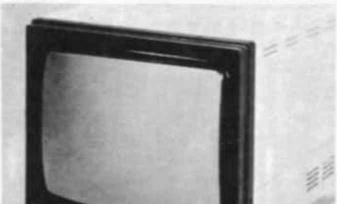

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Continued on page... 73 →

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5
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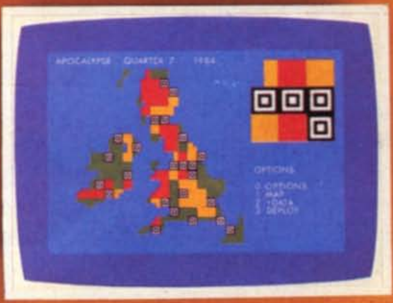

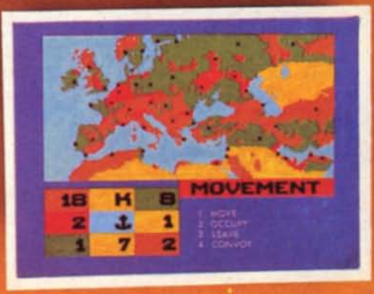

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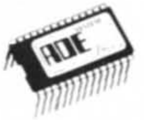

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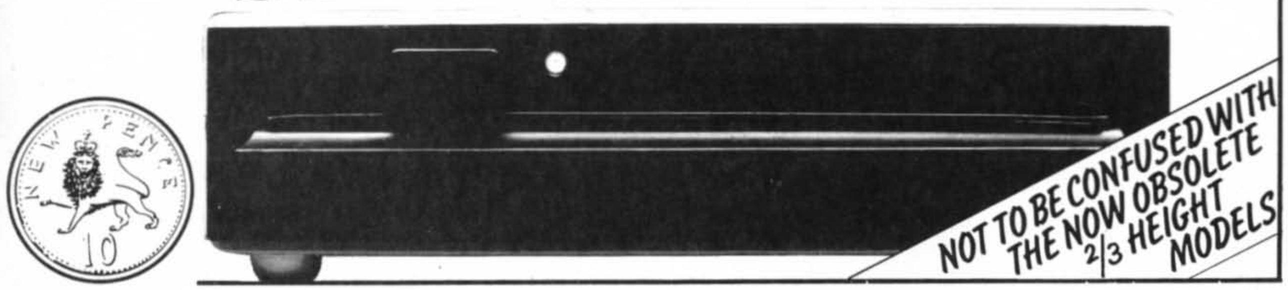
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10
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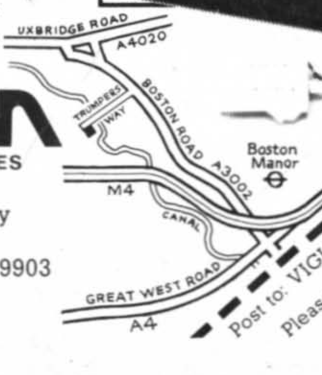
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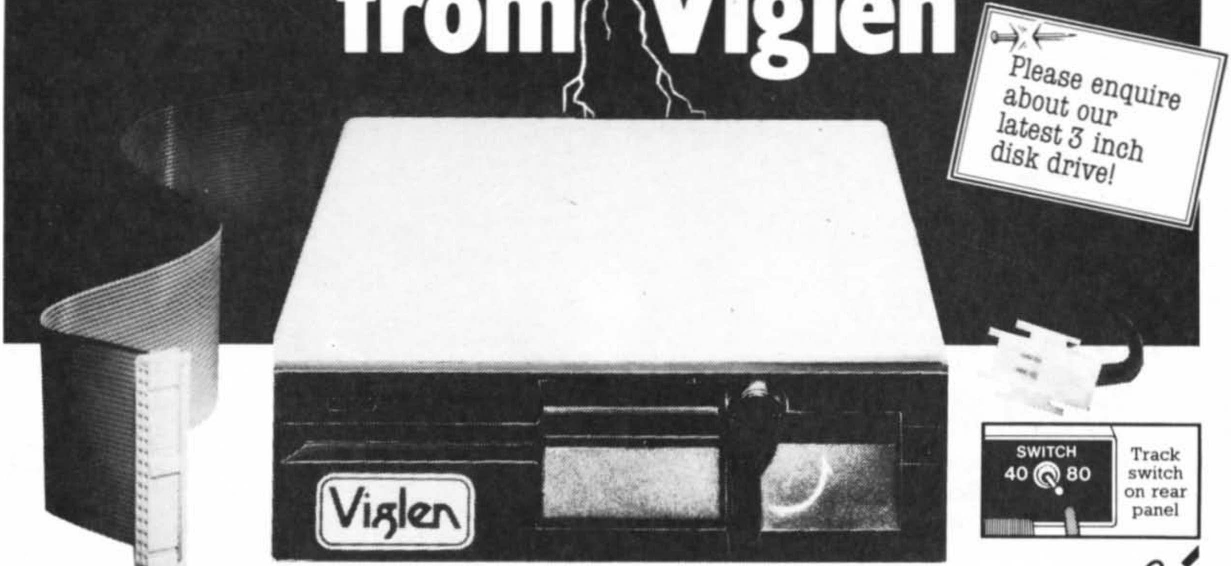

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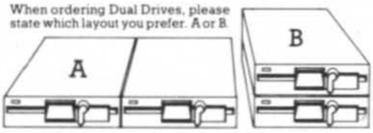

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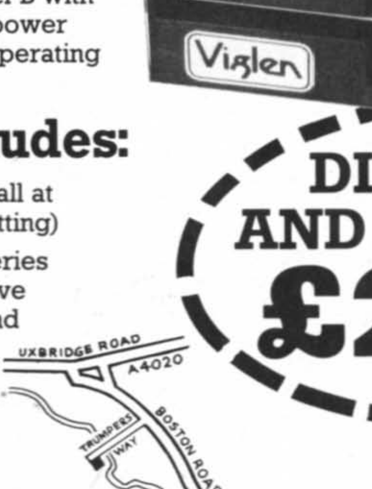
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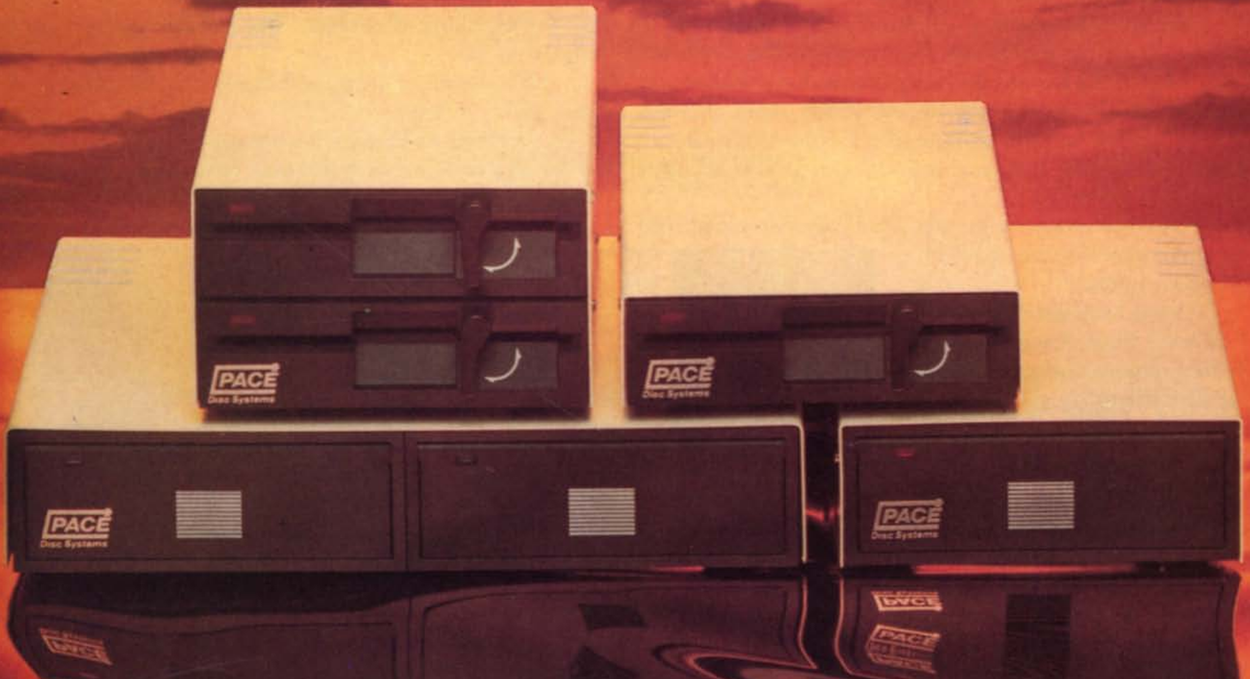
Drives of the future



Now available for the BBC Microcomputer, this superb range of high performance, low profile disc drives which give more data storage, and use less space.

The Pace range of drives include drives which are switchable between 40 and 80 tracks. As these drives are double sided they give a massive 400 k *per drive* in 80 track mode, whilst in 40 track mode they retain compatibility with Acornsoft and other commercially available software. These drives feature colour LED's to indicate operation.

All Pace drives are capable of being used as double density drives so that, as and when, a double density filing system and interface become available, the disc storage capacity will be doubled (eg. the dual 40/80 drive will have an unbelieveable 1.6m of storage).

Pace disc drives are designed to run off the BBC power supply and are supplied complete with all cables, a utilities disc and manual.

PACE
Disc Systems

92 NEW CROSS STREET,
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PSD3	Double Sided 40/80 Track (400k)	£305	£350.75
PSD4	Double Sided 80 Track Only (400k)	£285	£327.75
PSD5	Single Sided 40/80 Track (200k)	£235	£270.25
DUAL DRIVES			
PDD1	Single Sided 40 Track (200k)	£338	£388.70
PDD2	Double Sided 40 Track (400k)	£449	£516.35
PDD3	Double Sided 40/80 Track (800k)	£579	£665.85
PDD4	Double Sided 80 Track Only (800k)	£538	£618.70
PDD5	Single Sided 40/80 Track (400k)	£449	£516.35

Available from good computer stores everywhere including:
Computer City, Widnes, Cheshire. Tel: 051-420-3333. Computerama, Stafford. Tel: 0785-41899. Silcon Centre, Edinburgh. Tel: 031-557-4546.
Computerama, Stoke on Trent. Tel: 0782-268620. G.T.M., Leeds. Tel: 0532-647474. Wilding Computer Centre, Wigan. Tel: 0942-44382
National Micro Centre, Stockport. Tel: 061-483-3605. Sir Computers, Cardiff. Tel: 0222-21341. P.J. Microsystems, Crowthorne. Tel: 0344-772351.

The BBC Micro can now give your children a private education.

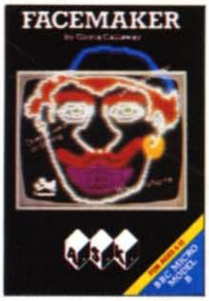
The BBC Microcomputer now accounts for 80% of the computers being ordered under the current D.O.I. Primary School Scheme.

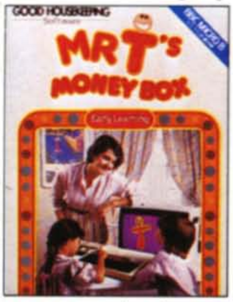
It's also the computer which a rapidly increasing number of people are choosing for their homes.

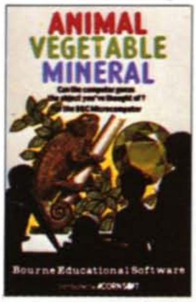
One of the reasons for its success is that it makes learning highly entertaining for everybody. From children who are getting to grips with the alphabet, to adults who want a gentle but intensive introduction to the complex world of computing.

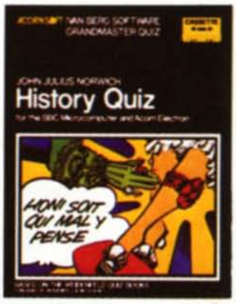
Now, there's a substantial new catalogue of educational programs specially for the BBC Microcomputer.

It has been developed by Acornsoft, the software division of Acorn Computers who manufacture the BBC Micro.









Making faces without getting scolded.

With the new Facemaker program, your children can make over a million faces. It's like an identi-kit, allowing them to depict anyone they want. They start by choosing the eyes. Then they can choose the mouth, the ears, the nose, the facial outline and the hairstyle.

And if they really fancy dressing up, they can add earrings and hats.

In doing all this, they learn to read and spell, as well as developing their powers of description.

The money program, two games for the price of one.

Mr. T. is an engaging little figment of the microchip who can teach your children all the complexities of our coinage system.

His Money Box program has two games, each of which can be played at different levels.

In Money Match, the challenge is to collect a set of coins, matching them according to shape, size and value.

In Money Box, you can give your child and Mr. T. a helping hand to get all the coins on the screen into the box. (It's always different, because the coins on the screen are based on the small change you have to hand.)

A chance to teach the Micro a thing or two.

With the Animal, Vegetable, Mineral program, the children can get the computer guessing.

They think of an object. The BBC Micro has to decide what it is.

If it doesn't come up with the answer, the children can keep giving it hints.

In doing so, they are encouraged to question the difference between such things as crocodiles and alligators, or whether oil is vegetable or mineral.

The program also encourages them to consult reference books so that they can ask the computer increasingly tough questions.

Questions on Julius Caesar from J. Julius Norwich.

John Julius Norwich's History Quiz is one of the new BBC Micro Grandmaster quiz series which also covers theatre, crime and detection, music, science fiction and royalty.

On the history front, there are 300 brain-testing questions, covering all aspects of British history from Julius Caesar to Margaret Thatcher.

And to increase the educational value, Mr. Norwich has posed the questions from angles which will give a broader understanding of events.

For the full catalogue, clip the coupon.

There are thirty more new BBC Micro programs in Acornsoft's new catalogue.

For a free copy, complete the coupon, or telephone 0933-79300. Or ask your local BBC Micro dealer.

If you're not yet a BBC Micro owner, you can get full details of the computer at the same time.

At home with the BBC microcomputer
2
Selected home education programs distributed by Acornsoft

To Acornsoft, c/o Vector Marketing, Denington Estate, Wellingborough, Northants NN8 2RL. Please send me the new Acornsoft catalogue "At Home With The BBC Microcomputer."

I would also like details of the BBC Micro ☐ (tick)

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BU4

ACORNSOFT

A SHOW TO SET PULSES RACING

If you get over-excited by looking at all the goodies on display at the latest Electron and BBC Micro User Show, you'll be able to check exactly how much they have sent your pulse racing.

One of the attractions at the show will be a novel Heartbeat Measuring Centre.

Visitors will be able to test their pulse rate using the latest offering from Mike Cook's Beeb Bodybuilding Course (see Page 118).

This second London show organised by *The Micro User* and *Electron User* is being held from Thursday to Sunday, March 29 to April 1.

It is taking place at the same venue as the highly-successful show last December – the New Horticultural Hall in Greycoat Street, London SW1.

This is only a short walk from Victoria Station. The show opens at 10am on each day and closes at 6pm, except on Sunday when doors close at 4pm.

So much good business was done by exhibitors at the December show that there will be even more stands this time.

The BBC's own telesoftware service will be making its own appearance at the show.

Acorn reject hi-tech 'smuggling' report

ACORN Computers has issued a categorical denial concerning claims that the company has been unwittingly caught up in hi-tech smuggling which could mean the end for the BBC Micro.

The report, which made headline news in a trade newspaper and sent shock waves through the industry, has been written off by company officials as "completely erroneous".

At the headquarters of Acorn International, Bob Bayham and his team were dumbfounded to read allegations that the arrival of BBC Micros in Hungary had put the future of the machine in jeopardy.

The newspaper article insisted that Acorn's supply of processor and memory chips from America was in danger of being cut off if the "illegal exports" continued.

It based this claim on the fact that the BBC Micro contains the NS6502 processor and various memory chips which the Reagan administration – according to the writer – doesn't want to fall into Russian hands.

"The whole story couldn't have been more incorrect", an Acorn spokesman told *The Micro User*.

"We have double checked and there has certainly been no smuggling from any of the sources named.

"Nor for that matter have we been threatened by the American customs officials, as was stated. The truth is that they haven't even been in touch with us".

The spokesman admitted there was a possibility that some BBC Micros may have reached Hungary – "probably through contra deals with software houses" – but he ridiculed the suggestion that the Russians would be able to take advantage of the technology involved.

Bayham: 'dumbfounded'

"If nothing else, the Russians are quite capable of making their own chips", he said.

"And apart from the most advanced chips, which are uncopiable by design, most of the others are already sold in video games form.

"The next step would be to stop selling automobiles to the Eastern block in case the generals drove up to the front line in them".

Norman Tebbitt, Secretary of State for Trade and Industry, jumped into the controversy about sales of British computers to Eastern Europe recently.

Accusing the Americans of being oversensitive about the issue, he said: "While you can go down the road and buy a BBC Micro or, if you have not got the money, can break into almost any school in the UK and pinch one – and then put it in your briefcase and walk out through Heathrow – the chances of being able to stop an Acorn computer going amiss are pretty thin".

20 mbytes for BBC Micro

UNICORNS are no longer mythical beasts, at least in the world of micro computers.

Now Torch Computers has produced its own Unicorn. Only it's not an animal, it's a hardware add-on for the BBC Micro.

The Unicorn consists of a 68000 processor, a Z80 processor, 256k of extra RAM, a 400k floppy disc and a 20mbyte hard disc.

The unit attaches to the BBC Micro via the tube, the 1MHz bus and the disc interface.

The 68000 processor allows the micro to run Unix (hence the name, formed from Unix +Acorn).

The Z80 chip supports CP/N, the microcomputer version of CP/M, which allows access to a wide range of professional software packages.

Now ITV goes BBC

NOW that the commercial TV companies have decided not to market their own ITV computer, some are to start producing educational software for the BBC Micro.

The BBC machine is now so widespread in schools that the ITV companies have had to swallow their pride.

The Central and Yorkshire TV companies are expected to be first in the field with educational programmes based on the BBC Micro, followed by Thames TV and Granada.

New ROMs on show

THE March Show has been chosen by Computer Concepts to unveil two of their latest ROMs.

The first is the long awaited – and badly needed – compiler for BBC Basic.

The compiler is totally comprehensive in that it will accept all BBC Basic statements capable of being compiled.

Real time and interpreted statements such as RENUMBER and EVAL, which cannot be compiled, are the only BBC Basic features omitted.

The second ROM consists of a large number of utilities to supplement BBC Basic, including search and replace, single key entry, merge and intelligent compacting, unpacking and renumber routines.

kosmos
Software
A French Language Learning Aid
BBC Micro Model B
The French Mistress
Level B
2

Beeb is becoming language machine

AFTER carving out a niche in general education, the BBC Micro is now rapidly becoming a language teaching machine.

Following the success of the intriguingly named The French Mistress, Kosmos have introduced two companion programs – The German Master and The Spanish Tutor.

The programs consist of a tuition control program which enables specific lessons to be read from the cassette.

These pre-recorded lessons cover a range of vocabulary subjects, complete phrases and lists of verbs fully conjugated in five tenses.

Once loaded into the micro, simple keyboard commands allow the lesson to be used in a variety of learning modes, including a test mode.

New lessons, at any level of grammar or vocabulary, can be created by the teacher or pupil. These can be stored on disc or cassette for later use.

A rival product comes from Acornsoft with the release of their Linkword language series. The series uses a radically new system of language teaching which, it is claimed, can cut learning time by as much as 70 per cent.

In field trials the new method allowed a basic grammar and vocabulary of 400 words – the contents of a single program – to be learnt in around 12 hours, as opposed to 40 hours with traditional systems.

Star attraction

ONE of the star attractions of the latest Electron and BBC Micro User Show will be the new, expanded technical advice stand.

"The stand attracted so much interest at the last show that we've had to increase it, both in terms of staff and sheer size, to cope with demand", said Mike Bibby, features editor of *The Micro User*.

Free *Micro User* hint sheets will be given away to visitors to the stand.

Commented Mike: "We receive a large number of queries on certain problem areas such as downloading. These hint sheets provide easy to understand answers".

For more specialised queries the whole team of *Micro User* writers and experts will be on hand.

"It's hard work for our team but it's also extremely enjoyable meeting our readers", said Mike Bibby.

THE first ROM based database for the BBC Micro, called DataGem, is about to be released by Gemini.

The 28k program – claimed to be the most comprehensive database ever for the BBC Micro – is supplied in the form of two ROMs on a carrier board.

This contains a protection which Gemini maintains will eliminate piracy.

Dale Hubbard, Gemini's managing director, told *The Micro User:* "Life has been made extremely difficult for

Why Cylon Attack took off

SIX months after its launch, sales of A&F's Cylon Attack have suddenly soared – a departure from normal market trends.

Speaking from their new Rochdale headquarters, managing director Mike FitzGerald told *The Micro User* why.

"We'd like to think people had just realised how good the game is", he said. "In fact it's because the £200 competition to find the highest score closes at the end of March. People who have achieved high scores with pirated copies have been buying legal ones in order to obtain the entry form.

"It just goes to show how widespread piracy is. Something has really got to be done about it".

A&F are determined to take a strong stand against illegal copiers.

"It's crazy", continued Mike. "These bright school kids who are ripping off software are exactly the people who should be working for us in a year or two's time.

"As it is, they'll destroy the industry and there'll be no jobs for them.

"It's got to be stopped, and at A&F we mean business. For instance, we've budgeted £100,000 next year solely for legal action against pirates".

Meanwhile, the infighting among software houses over "cover versions" of successful games continues. Atari has just circulated rival firms with a list of its copyright titles, threatening legal action against imitators.

Atari is to release BBC Micro versions of Ms. Pac-man, Pole Position and Dig Dug.

More TV software from BBC

LATEST innovation to come from the BBC Telesoftware Service is Club 707, a club page featuring programs sent in by the general public.

Updated fortnightly, the first offering is a turtle graphics program from Australia.

The BBC has taken a policy decision to provide more cash for the service, which might explain the sweatshirts Club 707 will send to successful contributors.

New policies include linking software with broadcast programs.

Radio Thin King – a primary learning series – is the first to have software broadcast for it.

Future plans include transmitting the software for the BBC Computer Literacy series, Computers in Control.

BBC MEANS BEANS

MAKING a success of selling baked beans in the future may all be down to the BBC Micro.

It is likely that in the next few years your up and coming supermarket manager will have been partly trained on a BBC machine.

This is all due to the experts at the Department of Management Sciences at the University of Manchester Institute of Science and Technology.

They have developed a simulation program on the BBC Micro to assist in the training of supermarket management.

Known as Supertrain, it provides a realistic method for competitive trading between supermarkets in a medium sized conurbation.

Compete

In the program as many as five supermarkets, each represented by a team of three or more management trainees, effectively compete for a week's trade.

All stores start off on an equal basis. Teams make a variety of decisions reflecting their store's policy on markups, special offers, advertising and stock replenishment.

Naturally, the one effectively selling the most goods is the winner.

But the program also calls for contestants to satisfy the needs of the customers and the supermarket staff.

"We have piloted it extensively both inside and outside UMIST", Dr J.M. Freeman, lecturer in management sciences, told *The Micro User*.

"The feedback has been very positive".

Basic II coming back

THOSE of you who want to buy a BBC Micro but are a bit worried by the fact that some of the latest models from Acorn have incorporated the original Basic I chip can rest easy.

An Acorn spokesman recently told Micro User than all micros being shipped would in future have the Basic II chip.

They still maintain, however, that Basic II is not the specification chip, just an enhancement.

ROM DATABASE FROM GEMINI

software thieves with our design.

"We expect to set a standard of protection which other software houses will strive to achieve".

Designed for disc based systems, DataGem will support files of more than three quarters of a megabyte, with more than 5,000 records allowed for each file.

Records are restricted to a maximum of 6,143 bytes, divided into a maximum of 62 fields.

The package supports a nine level hierarchical search system which includes all possible logical relations between any number of fields.

While the company is reluctant to announce firm dates for release, DataGem could well be in the dealers' shops this month.

'Trannie' comes into its own

THE humble transistor radio is rapidly becoming one of the more important peripherals for the BBC Micro.

More and more software is being broadcast over the airwaves.

Already the BBC have had their successful micro magazine program, The Chip Shop, running a takeaway service.

This consists of playing software over the BBC network late at night.

Enthusiasts record the programs from their radios and then load them into their micros, using decoding software supplied by the BBC.

But it's not just the BBC that is broadcasting micro programs over the air.

Radio West have been doing it for the past year with their Datarama micro show. And their programs don't need special software to run them once they've been recorded.

So successful has been Radio West's enterprise that commercial radio stations in Wiltshire and Cardiff have said they are to start broadcasting Datarama.

And more stations in other parts of the country are planning to do the same.

PROGRAMS AID HANDICAPPED

TWO new programs to enhance the life of the physically handicapped have been produced by Mr J.M. Leonard of Litchfield.

The first, Autotype, allows even a severely handicapped person to use the BBC Micro to produce high quality output on a printer.

It operates through a single switch system – the space bar or an external device such as a heat, blow or pressure switch.

Using this method, symbols, letters and whole words can be selected and used as in a word processor.

Each disc carries a vocabulary of common words, and these can be edited, either from the keyboard or using the single-switch method.

The resulting output can be stored on disc and output via a printer when required.

The second program consists of a suite of four games – Draughts, Fox and Geese, Line-of-Four and Noughts and Crosses.

As in Autotype, the games operate through a single switch input for each player.

The aim is to allow a severely handicapped person to play board games inaccessible in their normal form.

When both players are handicapped, they use separate controls. A non-handicapped person can also use the keyboard.

BASIC COURSE

JIM Notman, a regular contributor to *The Micro User*, is to present a Basic course for the BBC Micro at the University of Manchester's Department of Extra-Mural Studies from June 1 to 3.

Acorn's Profits on up and up

DESPITE a world-wide shortage of chips and a heavy investment in the US market, Acorn's profits continue to rise.

In the six months up to January 1, the company's profits were £5.21 million as compared to £2.04 million in the same period the previous year.

The figures hide the fact that the profits were diminished by a £2.5 million start-up investment in the US market.

Acorn is confident that the American venture will pay great dividends, however, and expects the operation to start showing profits by June.

One interesting offshoot of the US excursion is Acorn's establishment of a new research centre in Silicon Valley.

They expect this to result in marketable products within the next few months.

With orders at record levels and continuing export expansion – including the setting up of local assembly plants, for example in India – Acorn sees its future as secure.

In fact, according to an Acorn spokesman, the current chip "famine" could well act in Acorn's favour, inhibiting as it does the launch of rival machines.

Duncan Goodhew receives a BBC Micro on behalf of the Dyslexia Institute

BBC Micro to be major dyslexia teaching tool

THE BBC Micro is all set to become a major teaching tool for children who suffer from dyslexia – word blindness.

Vision Charity – an organisation set up by the video industry to help visually handicapped youngsters – has donated one to the Dyslexia Institute national headquarters in Staines.

At the official presentation, Olympic swimmer Duncan Goodhew – one of Britain's best known dyslexics – received the computer on the Institute's behalf.

It will be used initially as a simple teaching aid to develop reading, writing and spelling techniques. However they are convinced it will soon play an even more important role.

A spokesman explained: "Dyslexic children react very positively to information on screen, and at a later stage in their education could become very skilled in the use of computers.

"It is planned that this new one will eventually become an important thinking tool for our students as they progress towards higher language skills, requiring them to process, store and retrieve information".

Taking stock

IF you like to play the stock market there is now a software package for you. It won't stop you going bankrupt, but it'll help you to do it in an orderly way.

The package costs £15 from Fairhurst International and runs on a BBC model B.

It comes on a floppy disc, with a demonstration folio to experiment with and a user manual.

The "Sharewise" portfolio valuation program holds the purchase and sales details of a portfolio of investments.

New purchases of shares may be added, sales made, dividends notified and the latest prices held.

The details are held on disc and after being read in by the computer can be displayed in three ways – by a single security, a category of securities or the whole portfolio.

Output can be directed to a printer and a page-numbered printout produced.

TOPS IN BBC MARKETPLACE

THE Micro User is showing would-be rivals a clean pair of heels – and that's official.

Provisional audited ABC circulation figures for July to December 1983 just released reveal average monthly sales of 53,626.

This makes _The Micro User_ the undisputed leader serving the BBC Micro marketplace.

Trailing in second place is Acorn User, now taken over by newly formed Redwood Publishing, set up by Acorn boss Chris Curry.

A Redwood spokesman was quoted in the February issue of _The Publisher_ as saying: "We would be very pleased to see an ABC of 50,000 within the first year of our operations".

MiniServer in action at St. Albans School

It's self service

FRUSTRATED at the fact that BBC Micros with free Econet interfaces were available but there was no File Server software for them, St. Albans School Computer unit decided to write their own.

The result is MiniServer, a program which gives micros on a BBC network shared access to discs and printers.

Appendices to the guide that comes with MiniServer describe how to complete the hardware of a network on a low-cost basis.

TWO WAYS TO ENSURE YOU GET

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Please reserve me a copy of The Micro User magazine every month until further notice.

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Note to newsagent: The Micro User should be obtainable from your local wholesaler, or contact Steve Fletcher, Circulation Manager on 061-480 4153.

Lightpen moves into education

THREE new educational programes designed to make full use of their lightpen have been released by Datapen Microtechnology.

The first, Teletext Display Creator, allows the busy programmer to quickly create displays in colour graphics and text in his own programs.

In Britain – the first in a series of geographical tests – a map of Britain is drawn on the screen.

The user is then quizzed on a series of locations and gives his answers by using the lightpen. The program is easily adapted to incorporate new data.

Beebpen is a comprehensive colour drawing program. It allows the user to create high resolution pictures.

Its features include freehand painting, use of all plot commands, on screen text, and circles.

Cursor co-ordinates allow accurate drawing and three cursors can be in use at one time.

..and navigation

THE most complete and realistic navigational simulation exercise available for the BBC Micro is claimed for Night Landfall, just released by Offshore Instruments.

The program, developed by Geoff Gordon, is based on a night passage between Dartmouth and Guernsey.

Offshore maintain that whatever his level of experience and expertise he will gain invaluable and concentrated practice to back up his sailing

ROMS

SOFTWARE FOR THE BBC MICRO

GREMLIN

This is a machine language monitor ROM designed for use as an aid to development and debugging of machine code programs.

Anyone writing machine code programs will at some time come across a bug in the program. Trying to track down the bug is usually far from easy and this is where GREMLIN will prove invaluable. The ROM contains a full machine code monitor including features such as a disassembler, memory move and search routines etc.

GREMLIN includes many advanced features like a full expression evaluator, and an assembler. It can single step through programs both in RAM and ROM and allows operation on any sideways ROM. Variables may be declared and used in expressions and with most commands much like BASIC. This makes the system very powerful but simple to use. Other features include —

WORKS IN ANY SCREEN MODE
DISASSEMBLER & ASSEMBLER
FULL STATUS SHOWS REGISTERS, STACK etc.
UP TO 8 BREAKPOINTS
SINGLE STEPS THROUGH ANY ROM
BUILT IN HELP MENU
SPECIAL MODE FOR DEBUGGING GRAPHICS PROGRAMS

Supplied with simple to understand fitting instructions and spiral bound manual. £28 plus £1 p&p plus VAT

TERMI

TERMI is a general purpose communications ROM for the BBC micro. It will allow communication between the BBC and practically any other machine with an RS 232 interface. This ROM is not dedicated to emulating a particular terminal but has several modes of operation. It can be used as a slave graphics terminal or, in the custom mode, as a DEC VT52 terminal emulator. It will also act as a dumb terminal. The user is free to swap between 40 and 80 column screen modes even while on-line.

The most powerful feature of this package allows the user to send ASCII files from a BBC disc down the line or to receive files from the RS 232 and to save these on disc. It also allows a copy to be kept on the printer.

TERMI is supplied with a "CUSTOM" program on disc that allows the user to set up his own protocols i.e. line speeds, screen modes, start & stop bits etc., and to have these loaded from the disc every time TERMI is used.

TERMI is an 8K ROM supplied with a manual, fitting instructions and a customisation disc. £28.00 plus £1 p&p plus VAT.

new release

Communicator

VT100 Terminal emulation

COMMUNICATOR is a single chip that plugs into a normal BBC Micro and turns it into an advanced DEC VT100 terminal emulator. The combined cost of a BBC Micro and this software is considerably less than a new VT100 — and you get all the advantages of one of the best micro computers available. A large range of high quality software is already available for this micro — word processors, spreadsheets etc.

Computer Concepts commissioned Specialist Software Products Ltd. to produce the most advanced emulator possible for the BBC microcomputer, its features include:

★ Exceptional XON/XOFF handshaking, even while spooling at speeds of 9600 baud.
★ Superb menu driven configuration — a great improvement over the real VT100.
★ Double height and double width character lines plus two character enhancements.
★ Independent windowing — for split screen operation.
★ VT100 character graphics.
★ Disc spooling and transmission of ASCII files.
★ Application keypad mode — including generation of these escape sequences.
★ VT52 mode.

Nearly a full VT100, the most notable omission is the 132 character mode — impossible to implement on the BBC Micro.

While COMMUNICATOR can be used for direct communication to a mini or mainframe, it also allows access to the world of electronic mail. This ROM is already widely used with the DAILCOM electronic mail service. Text may be prepared off-line with the BBC machine and transmitted at full speed via a modem when on-line to the system.

COMMUNICATOR is a 16k ROM supplied with a spiral bound manual and clear fitting instructions. £59.00 plus £1 p&p plus VAT.

Both TERMI and COMMUNICATOR may be used for any of the following

Mainframe or mini communication.
DEC VT52 terminal emulation.
British Telecom Gold. (Electronic Mail)
Bulletin boards of most types
DISTEL, REWTEL, MAPTEL etc.
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COMPUTING NEWS
APRIL 1984
ISSUE 6
A GSL COMPUTING PUBLICATION

Winchester
for

GSL's Sales Team

THE GSL WINCHESTER SYSTEM WITHOUT DOUBT A RESOUNDING SUCCESS STORY

Over the last six months the interest shown in the GSL Winchester System has been overwhelming. GSL's salesforce have received over three and a half thousand written enquiries requesting further information from schools, colleges, universities and industry. Telephone enquiries have been too numerous to calculate. The recent ACORN Education Show resulted in 24 orders for the Winchester System in just one week. Many county purchasers attending the exhibition showed great interest and requested systems for evaluation.

The acceleration of orders for the system has been phenomenal. This has been mainly attributed to the fact that this system has been tailor designed for education.

An extremely confident Sales Manager, Rod Lewis, predicted an even brighter future. Thanks must go to the superb technical expertise in the form of computer technicians, electronics engineers and physicists for the success of this high technology system. He said "The appointment of Pace Software Supplies in Bradford as Sole Northern Distributors has made sure that the sales and technical support for the GSL Winchester System is efficient and universal.

Dealers able to offer the high technical support needed are now being appointed, these include:

		Telephone
Oakleaf Computers Ltd.	**Grantham**	**(0476) 76994**
Cardiff Micro Centre	**Cardiff**	**(0296) 34811**
Midwitch Computers	**Suffolk**	**(0379) 898751**
Wiltshire Micro Centre	**Swindon**	**(0793) 612299**
Highland Computers	**Llanelli**	**(0554) 70517**
Coventry Micro Centre	**Coventry**	**(0203) 58942**
Lendac Systems Ltd.	**Dublin**	**(0001) 710226**

The requests for dealerships have not just been limited to the UK. We have received written requests literally from all over the world, Australia, New Zealand, USA, Denmark, Belgium - Luxembourg, Canada, Israel and Hong Kong resulting in several systems now being installed overseas. More dealers in Europe will follow. Rod Lewis went on to say "The current and continuing sales success of the GSL Winchester System is assured. This is attributed to the enthusiasm and technical knowledge of its sales force, Miss Wendy Russell, Mr. Martin Holmes and Mr. Phil McRae."

"Due to the increasing demand in GSL's services we will be moving to new, larger premises in the early part of 1984. This will enable us to offer our customers, whether they are large educational county council contracts, or the home user, even greater facilities with more class 1 clean rooms for repairs and research - development and larger office and showroom facilities." Said Rod Lewis. "Obviously we will require more staff both technical and sales to maintain the high standards we set. It feels good to be associated with a happy and successful company. A great success, long may it continue".

It is worth mentioning that the sales team are always willing to demonstrate any of the systems at GSL. Just contact Rod Lewis to make an appointment.

	Price £
5 MB Winchester System	**1650.00**
10 MB Winchester System	**1950.00**
20 MB Winchester System	**2400.00**
65 MB Winchester System	**4700.00**
105 MB Winchester System	**5130.00**
140 MB Winchester System	**7000.00**
280 MB Winchester System	**9500.00**

Torch Z80 Disk Pack System

Following close on the heels of the Winchester System is the Torch Z80. This is proving very popular with the business studies departments in colleges and universities and, in effect, is a complete business machine, upgrading the BBC Model B Microcomputer.

It provides 800K of disc storage plus a Z80 second processor running Torch's own CP/M compatible operating system. Discs can be used for storage under Acorn DFS System or for CP/M programmes.

A free comprehensive software package is provided with the disc pack. It includes word and data processing and spread sheet programmes along with utilities and Torch cell font end menu systems. The Z80 disc pack is fully compatible with other Torch computers.

PROCESSORS. 4 MHz Z80 application processor.

MEMORY 64K RAM and 16K ROM

FREE SOFTWARE PROVIDED. Torch CPN CP/M compatible O/S. Disc utilities (poke disc, map disc) Music system (MUSCMPX Music), miscellaneous utilities (FRONT RDACORN TORCHBUG etc) Perfect writer, perfect speller, perfect calc, perfect filer, word processor, spelling checker, spread sheet database.

DISC STORAGE 2 400K (formatted) floppy disc drives

TORCH SUPPORTED OPERATING SYSTEMS CPN (CP/M compatible) MCP-CPN Network version (option).

LANGUAGES AVAILABLE: *special TORCH routines available COBOL, FORTRAN PASCAL BASIC BBC BASIC (Z80), C(Z80), FORTH LISP PILOT PROLOG BCPL

TEXT & GRAPHICS: Provided with BBC Model B

KEYBOARD: Provided by BBC Model B.

GSL Announce the Hitachi 3" Disc Drive

Due to the ever increasing demand for reliable 3" disc drives, GSL are now marketing the proven Hitachi 3" drive. Ideal for Education the Hitachi drive is reliable and robust. Cased in rigid steel the drive is coloured to match the BBC Micro.

The compact disc which is now standard in Japan are strong and easily stored, like a music cassette. By simply turning the disc over they give 100K per side. The 3" discs encased in rigid plastic are also protected by a mechanical tab which prevents overwriting of data.

Like all GSL disc drives the Hitachi 3" drive runs off the BBC power supply thus saving considerable money over drives using their own power unit.

GSL have also ensured that all their disc drives are compatible. The Hitachi 3" can be run in tandem with the Shugart 5¼" drives.

*Price including case, leads and utility disc £180.00 exclude carriage and packing and V.A.T.

GSL Analogue Signal Display & Analysis System

This systems enables a BBC Mierccomputer (Model B) to function as a two channel, large screen, storage cscilloscope, for frequencies up to high audio values.

The basic system comprises an analogue to digital interface unit which is connected to the computer via the 1MHz bus. The accompanying software package enables input signals to be displayed in the time domain and also, if required, analysed via fourier transformation to give frequency domain representation.

The main features of the system are:

1. Two channel, large screen, display of signal amplitude vs time, with grid scaling information, channel identification and pk/pk measurement.
2. Repetitive or externally triggered sampling of input signals.
3. Display time (total sampling period) variable from 0.002 sec. to 25 secs.
4. Number of sample values = 100 per channel.
5. Minimum sampling time = 20 sec. (inclusive of both channels).
6. Software controlled triggering delay available.
7. Option to list individual sample values.
8. Either the following or preceeding 'screen' of data is stored for each sampling period (the latter, only in triggered mode), and this may be displayed when required.
9. Fourier analysis of the data for either channel may be performed, and the frequency domain representation plotted (50 values).
10. Up to 5 frequency domain plots may be stored internally and recalled for comparison with the current plot.
11. Full screens of information may be 'dumped' to a printer (NEC PC-8023B-C Dot Matrix Printer), for both the amplitude vs time and amplitude vs frequency displays.

The programme is loaded from tape using the command CHAIN "scope".

Price £350.00 Excluding carriage + VAT.

EDUCATION APPROVED DISC DRIVES MATCHING ACORN BBC MICRO

All disc drives supplied in metal case finished to match the Acorn BBC microcomputer.

Shugart SA200 Capacity 100K — Price £149.95 including Leads.

Less than two-thirds the height of standard models, Shugart's single-sided SA200 5-25 inch minifloppy disc drive offers 125 or 250 Kbytes of capacity in a low cost highly reliable package. Low cost, compact size and high reliability make the SA200 an ideal choice for entry level desk top applications in personal computers, word processors, memory typewriters, portable computers or terminal add ons. Package includes all interconnecting leads.

Shugart SA455 Capacity 200K — Price £238.00 including Leads.

Shugart SA465 Capacity 400K — Price £281.50 including Leads.
Prices excluding carriage and VAT.

Shugarts SA455/465 half height mini floppy disc drive offer a compact alternative to standard height drives for desk top systems requiring maximum performance in a greatly reduced space. Since users can quickly double existing storage capacity by fitting two drives in the space formerly occupied by one standard minifloppy the SA455/465 drives provided and excellent means to increase storage capacity without increasing space.

Showroom facility at GSL enlarged

Peripherals always available

GSL has an extensive showroom displaying all their advertised products and more. Customers are encouraged to use the equipment on show and helpful advice and personal demonstrations are readily available.

GSL know from talking to their customers that nothing is more frustrating than responding to an advertisement and finding the advertised goods are out of stock or not readily available. GSL hold large stocks of all computer peripherals advertised.

The GSL range is constantly growing and currently includes:

- BBC MICROCOMPUTER
- SHUGART DISC DRIVE RANGE
- NEC PRINTERS
- EPSOM PRINTERS
- PRINTER BUFFER
- MICROVITEC COLOUR MONITORS
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Part 12 of MIKE BIBBY'S introduction to programming

13÷4=3

When everything goes, and you ditch the remainder

STRAIGHT to work this month. Try running Program I:

```
10 REM *** PROGRAM I ***
20 MODE 6
30 FOR loop%=0 TO 17
40 PRINT loop% DIV 3
50 NEXT loop%
```

And now you are probably wondering what's going on.

Well, do you remember doing divisions in your schooldays? You did sums like this:

3 R 1
13 ÷ 4

and probably read the answer out something like this: "4 goes into 13 three times remainder 1".

Or, if you were mathematically inclined, you might have said: "The quotient is 3, the remainder 1".

Notice, you didn't use fractions or decimals then – you worked in whole numbers.

Now in line 40 of Program I the DIV means division. It's a special sort of division though, in which you work only in whole numbers – we call it integer division. You ignore any remainders.

The answer is just "How many times it goes" – the quotient.

So 13 DIV 4 would give the answer 3. Try this by entering:

```
PRINT 13 DIV 4
```

and you'll see what happens.

In Program I, when *loop%* has values between one and two, three "doesn't go" so the answer is zero for each sum – remember, we ignore the remainders.

For *loop%* equal three to five, three "goes once", with various remainders which we ignore, so the answer for these three sums is one.

I think you can see by now why the next three DIVs gives the answer two.

What would happen if we changed line 40 to:

```
40 PRINT loop% DIV 40
```

See if you can visualise it before you try running the amended program.

Program II uses MOD instead of DIV. Again this is a sort of integer division, but this time we ignore the quotient – how many times it "goes" – and just take the remainder as the answer.

```
10 REM *** PROGRAM II ***
20 MODE 6
30 FOR loop%=0 TO 17
40 PRINT loop% MOD 3
50 NEXT loop%
```

Fascinating, isn't it? The answers cycle 0, 1, 2, 0, 1, 2, 0, 1, 2. It's quite simple to see why:

0 divided by 3 gives remainder 0
1 divided by 3 gives remainder 1
2 divided by 3 gives remainder 2
3 divided by 3 gives remainder 0
4 divided by 3 gives remainder 1
5 divided by 3 gives remainder 2
6 divided by 3 gives remainder 0

and so on.

Again, try to visualise what will happen if you change line 40 to:

```
40 PRINT loop% MOD 4
```

This time it cycles 0, 1, 2, 3.

Believe it or not, we often want to cycle through numbers this way. You can use the technique with REPEAT . . . UNTIL loops:

```
10 REM *** PROGRAM III ***
20 MODE 6
30 counter%=0
40 REPEAT
50 PRINT counter% MOD 3
60 counter%=counter%+1
70 UNTIL counter%=21
```

Notice that the numbers cycle through 0, 1 and 2. Suppose you want them to cycle between 1, 2 and 3. This is easily done by changing line 50 to:

```
50 PRINT counter% MOD 3 + 1
```

In other words, you add an offset of one to the old line 50, so what would

→

From Page 39

have been 0 becomes a 1, what would have been 1 becomes a 2 and what would have been 2 becomes a 3.

Of course the next time through the loop the old line 50 would have "flipped" back to 0, so the new version flips back to 1 and so on.

Can you alter line 50 to:

```
50 PRINT (counter% MOD 3) * 2
```

Can you see what's happening? Can you make it cycle 0, 3, 6?

```
10 REM *** PROGRAM IV ***
20 MODE 5
30 counter%=0
40 REPEAT
50 COLOUR counter% MOD 4
60 PRINT "Colour"; counter%
70 FOR delay%=0 TO 1000:NEXT delay%
80 counter%=counter%+1
90 UNTIL FALSE
```

Program IV is one of the most complex we have so far covered, so let's look at it in detail.

When you're deciphering a program, the first thing you need to know is what it's supposed to be doing.

Well, Program IV is meant to print out:

Colour 0
Colour 1
Colour 2
Colour 3

repeatedly, each line in the appropriate colour – that is, 'Colour 3' in logical colour three and so on.

Lines 40 to 90 form a REPEAT ... UNTIL loop designed to do this.

counter% increases each time through the loop (line 80). We use it to choose the colour in line 50, by setting the colour to *counter%* MOD 4 – if you cast your mind back, this will cycle between 0, 1, 2 and 3.

Line 70 may confuse you – it's just a FOR ... NEXT loop with nothing in between. I'm able to put the FOR ... NEXT in the same line because I've used a colon between them. We covered that last month.

Having a loop which does "nothing" may seem rather crazy, but it's only there for delay purposes, as the name of the loop variable suggests.

The micro does the loop 1001 times – doing nothing each time admittedly, but taking up time doing it.

Try omitting the line and see what happens.

As it stands Program IV has a flaw. Since our background colour is logical colour zero (black) when the foreground is logical colour zero, the message doesn't show.

This being so, there's not much point in getting the micro to print it out. We may as well just cycle through 1, 2 and 3.

Well, we can cycle through 0, 1 and 2 with MOD 3, so MOD 3 + 1 will cycle through 1, 2 and 3 since we are adding an offset of one.

So let's change line 50 to:

```
50 COLOUR counter% MOD 3 + 1
```

and the logical colours 1, 2 and 3 will be displayed.

Try altering Program IV so that it outputs all the colours available in Mode 2.

```
10 REM *** PROGRAM V ***
20 MODE 5
30 asterisk$=""
40 FOR loop%=0 TO 18
50 asterisk$=asterisk$+"*"
60 COLOUR loop% MOD 3 + 1
70 PRINT asterisk$
80 NEXT loop%
```

Isn't Program V pretty? We've printed triangles of asterisks before, but never multi-coloured ones.

If you remember, we rang the changes with our triangles – inverting them, making pyramids and so on.

Why not try to recreate those triangles in technicolour? If you're short of inspiration have a look at the beginners' article in the January edition of *The Micro User*. The "revision" will do you good – consolidating ideas we'll take for granted from now on.

```
10 REM *** PROGRAM VI ***
20 FOR loop%=0 TO 5
30 PRINT RND(6)
40 NEXT loop%
```

If you look at Program VI you'll notice that we don't have a line to select the mode we're in as we've done with other programs. There's a reason!

Type it in, select mode 4 with:

```
MODE 4
```

and RUN the program.

Then RUN it again immediately without clearing the screen. I want you to compare the outputs of each run – that's why I didn't change mode at the beginning of the program.

Unless you're particularly unlucky, the two sets of outputs should differ. If they don't, run the program again until they do.

Wait a minute, though. Hasn't something gone wrong somewhere? After all, it's the same program – how can there be two different outputs?

Well, the evidence should be there in front of you. The secret is, of course, in line 30.

You see, RND is short for random. RND(6) picks a whole number at random between 1 and 6. You can't decide which, the computer does!

RND(12) would pick a whole number between 1 and 12 and so on.

Actually, this RND business can be quite complicated. As an example RND(0) and RND(1) are special, and on top of that RND isn't exactly random! For the moment, however, we'll ignore all that.

You may be wondering why we need random numbers at all. They're excellent for games – for instance you can generate a realistic dice throw.

And, as one of my more cynical friends puts it, you can make the micro seem more human if it acts randomly.

```
10 REM *** PROGRAM VII ***
20 MODE 2
30 asterisk$=""
40 FOR loop%=0 TO 5
50 asterisk$=asterisk$+"*"
60 COLOUR RND(7)
70 PRINT asterisk$
80 NEXT loop%
```

Try Program VII. Each time you run it it should give a different pattern of colours unless you randomly pick the pattern you had before – which is always possible.

Notice that line 60 picks colours in the range 1 to 7. This time we've no need to worry about an offset to avoid colour 0, the background colour.

I've stopped at 7 so as to avoid the flashing colours. Change line 60 to:

```
60 COLOUR RND(15)
```

if you want to include these.

That's all for this month. Next month we'll be looking at procedures.

ARIES~B20

Add 20K to your BBC micro in five minutes

Features

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- ★ If not completely satisfied with your purchase, we will refund your money in full providing you return the ARIES-B20 in good condition in its original packaging within 14 days

Machine requirements:

- ★ BBC Micro model B
- ★ MOS 1.2 or later
- ★ Plugs into CPU socket and 1 sideways ROM socket

Also available IEEE-488 interface. Coming soon: Compatible ROM expansion board.

How to Order:

Send cheque or postal order made payable to: Cambridge Computer Consultants Ltd and forward to:
Cambridge Computer
Consultants Ltd, FREEPOST,
Cambridge CB1 1BR.
Telephone Cambridge
0223- 210677

Please send me (Qty). . . . . ARIES-B20(s) at £99.95 (incl. p.p. & VAT).
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Cambridge Computer Consultants Ltd for £. . . . .

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Address . . . .

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Cambridge Computer Consultants Ltd, FREEPOST Cambridge CB1 1BR
Telephone Cambridge 0223-210677

Watford Electronics

Dept. BBC, CARDIFF ROAD, WATFORD, HERTS. ENGLAND.
Tel: Watford (0923) 40588/37774 Telex: 8956095 WAELEC

Prices subject to change without notice.

BBC MICROCOMPUTER

Model A—£260; Model B—£346

Upgrade your Model A with our Upgrade Kits and save yourself £ s s s

● BBC1 16K Memory (8 x 4816AP-3 100nS)	**£24.00**
● BBC2 Printer User I/O Port	**£8.10**
● BBC3 Disc Interface Kit	**£95.00**
● BBC4 Analogue I/O Kit	**£8.25**
● BBC6 Expansion Bus Kit	**£7.75**
● Complete Mod. A to B Upgrade Kit	**£55.00**

Dust Cover for BBC Micro

Protects your expensive Micro from foreign bodies. **£3.95**

SEIKOSHA GP100A

10" Tractor Feed, 80 columns, 50CPS Normal & Double width Char, Dot res graphics. Parallel Interface standard.

ONLY **£155** (£7 carr.)

INTERFACE CABLE

BBC to Seikosha Cable **£8.00**

FRICTION FEED

Attachment for GP100A or 250X Printers **£28**

● Spare RIBBON for GP80	**£4.50**
● Spare RIBBON for GP100	**£4.95**
● Spare RIBBON for GP250	**£5.95**

GP-700 Colour Printer **Screen-dump** routine in **ROM FOR BBC** Micro £12

Epson RX80

100 CPS, 9 x 9 matrix, dot addressable graphics, condensed and double width printing. Normal, Italic and Elite Graphics. Tractor feed, 10" max width, bi-directional, logic seeking. Centronics Interface standard.

ONLY **£235** (£7 carr.)

RX80 F/T PRINTER

As above but has both Friction and Tractor Feed. £259 (£7 carr. Securicor)

Epson FX80 Printer

160 CPS, 11 x 9 matrix, proportional spacing, superscripts, subscripts, dot addressable graphics. Normal, Italic and Elite characters. Up to 256 user definable characters. Down loadable character set. Condensed and double width printing. Full proportional spacing. Four user defined margin positions. Tractor and Friction feed. 10" maximum width Bi-directional, logic seeking Centronics interface standard.

ONLY **£345** (£7 carr.)

Epson FX100 Printer

Same as FX80 but has a 15" wide Carriage **£495**

	Ribbons	**Dust Covers**
MX80FT	**£4.75**	**£4.50**
MX100	**£10.00**	**£5.25**
FX80	**£4.75**	**£4.95**
RX80	**£4.75**	**£4.50**
GP80	**£4.50**	–
GP100	**£4.95**	**£3.95**
GP250	**£5.95**	**£3.95**

RX & FX PRINTER INTERFACES

RS232	**£35**
RS232 plus 2K Buffer	**£69**
IEEE 488	**£65**
2K Parallel	**£58**

PRINTER INTERFACE BUFFER

Neatly packaged self contained box, supplied complete with all leads, manual and detachable power supply.

Price: 16K Unit	**£99**
Price: 48K Unit	**£135**

BROTHER HR-15

DAISY-WHEEL PRINTER

An exceptionally high quality daisy wheel printer at the price of a dot matrix printer. 18CPS; bi-directional, 3K of buffer; has clear buffer facility, carriage skip movement, proportional spacing; underlining; bold print and shadow print. Prints in two colours; super and subscript facility. Impact control facility to vary pressure on paper for making carbon copies. Has Centronics parallel or RS-232 interface. Connects directly to BBC Micro. A ribbon cassette plus a separate red ribbon. Optional extras: single sheet feeder takes up to 150 A4 sheets; a keyboard that transforms HR15 into a sophisticated electronics typewriter. Attractively finished in beige.

ONLY **£375**

Single Sheet Feeder	**£199**
Keyboard	**£150**

Ribbon **£3**; Daisy Wheel **£18**

LISTING PAPER

8½" or 9½" Fanfold paper plain or ruled (1000 sheets)	**£7** (£1.50p carr.)
15" Fanfold paper	**£9** (£1.50p carr.)
Teleprinter Roll (econo paper)	**£4** (£1.50p carr.)

PRINTER LEAD 36"

Ready made printer lead to interface BBC Micro to EPSON, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA, etc., Printers.

ONLY £8

Special Extra long 5 foot Cable **£12**

BBC Micro WORD-PROCESSING PACKAGE

A complete word processing package consisting of: BBC Model B, Zenith 12" Green or Amber Monitor, Twin 200K highly reliable (1 year warranty) Teac Disc Drives in matching beige colour, the popular WORDWISE word processor, Watford's own highly sophisticated 62 File DFS interface fitted, the world renowned Brother HR15 Daisy Wheel Printer, Gemini's Beebplot & Beebcalc Spreadsheet Analysis Software discs, 10 blank diskettes, 500 sheets of fan-fold paper. Manuals and all the leads. To enable you to carry your Micro around, we shall pack it in our Antique Brown leatherette Attache carrying case.

ONLY **£1,275** (carr. £15)

(P.S. We will alter the package to suit your particular requirement. Call in for a demonstration.)

5¼" DISKETTES

(2 years warranty)

● 10 WABASH Diskettes S/S	**£15**
● 10 WABASH Diskettes D/S	**£25**

(Lifetime warranty)

● 10 Verbatim or 3M Diskettes S/S	**£17**
● 10 Verbatim or 3M Diskettes D/S	**£27**

DISC ALBUMS

Attractively finished in beige leatherlook vinyl. Stores, protects and displays 20 discs in double-sided clear view pockets. ONLY **£4.95**

PLASTIC LIBRARY CASES for Disc Storage

5¼" (holds 10) **£2**

LOCKABLE STORAGE UNITS

Attractively finished, strong beige plastic base fitted with dividers. Smoke acrylic top. Supplied with adhesive title strips for ease of filing.

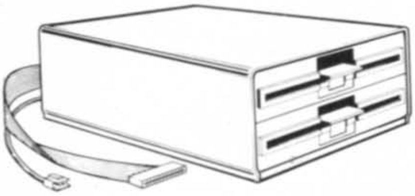
● M-35 Holds upton 35 mini discs	**£16**
● M-85 Holds upto 85 mini discs	**£20**

FLOPPY HEAD CLEANERS

Unless your office/home is dust free, you should clean heads at least once a week to avoid the risk of cross contamination.
Simply apply the cleaner to one of the specially formulated cleaning discs, insert into the drive and initialise. If your system has no initialisation program then insert the disc and open and close the door 5 times.

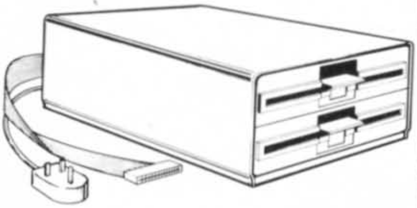
£16.00

DISC DRIVES CASED WITH CABLES (less PSU)



- CLS100 TEC Single sided 40 track 100K, 5¼" Disc Drive **£139**
- CLS400 Mitsubishi Double sided 80 track 400K, 5¼" Disc Drive **£199**
- CLS400S Mitsubishi Double sided 40/80 track Switchable, 400K, 5¼" Disc Drive **£215**
- CLD200 TEC Single sided 40 track 200K, twin 5¼" Drives **£259**
- CLD800 Mitsubishi Double sided 80 track 800K, 5¼" TWIN Drives **£375**
- CLD800S Mitsubishi Double sided 40/80 track switchable, 800K, Drives **£399**

(CUMANA) DRIVES CASED WITH PSU & CABLES



- CS100 TEC Single sided 40 track 100K 5¼" Single Disc Drive **£165**
- CS200 TEC Single sided 80 track 200K 5¼" Single Disc Drive **£230**
- CS400 Mitsubishi Double sided 80 track 400K 5¼" Single Drive **£265**
- CS400S Mitsubishi Double sided 40/80 track 400K 5¼" Single Drive **£340**
- CD200 TEC Single sided 40 track 200K 5¼" TWIN Disc Drives **£310**
- CD400 TEC Single sided 80 track 400K 5¼" TWIN Disc Drives **£430**
- CD800 Mitsubishi Double sided 80 track 800K 5¼" TWIN Drives **£440**
- CD800S Mitsubishi Double sided 40/80 track Switchable 800K TWIN Drives **£465**

- SPARE DRIVE CABLES, SINGLE **£6;** DUAL **£9**

MONITORS

MICROVITEC 1431
14" Colour Monitor, RGB Input. (as used in BBC programmes) FREE Interface Lead. **£205**

- **MICROVITEC 1451** Hi-res 14" Monitor incl. lead **£319**
- **NEW MICROVITEC 14"** Colour Monitor/Composite Video **£249**
- **KAGA RGB** 12" Medium Resolution Colour **£205**
- **KAGA RGB** 12" High Resolution Colour **£259**
- **KAGA** 12" Standard resolution colour MONITOR/COMPOSITE VIDEO **ONLY £209**
- **BNC** Connecting Lead **£3**
- **RGB** Connecting Lead **£5**
- **ZENITH 12"** Green or Amber Monitor Hi-resolution **£75**

Carriage on Monitors £7 (Securicor)

READY-MADE LEADS

CASSETTE LEADS 7 pin DIN Plug	
to 5 pin DIN Plug + 1 Jack Plug	**£2.00**
to 3 pin DIN Plug + 1 Jack Plug	**£2.00**
to 7 pin DIN Plug	**£2.50**
to 3 Jack Plugs	**£2.00**
6 pin DIN to 6 pin DIN Plug (RGB)	**£2.50**
Monitor Lead, BNC to PHONO	**£3.00**

Disc Drive to BBC Micro Power Lead
Single: **£3.00** Dual **£3.75**

NEW
Mk II 13 ROM SOCKET BOARD

Now all lines fully buffered – On board battery back-up facility – will now accept EPROMS 2716, 2732, 2764 & 27128 and ROMs 6116 & 6264.
Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied.
Our 13 ROM SOCKETS BOARD enables the User to increase the Sideways ROM capacity the basic four sockets on the main board upto the full SIXTEEN capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)
The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.
All lines are fully buffered and the Board meets or exceeds all timings for operation in the BBC Microcomputer. When fully populated, the ROM Board consumes less than half the recommended maximum current limit.

Supplied ready-built and tested complete with fitting instructions.

ONLY £29.95 (carr. £1)

EPROMs & CMOS RAMs for BBC MICRO

2764-250nS (8K ROM)	**£5.95**
27128-250nS (16K ROM)	**£19.00**
6116-150nS (2K RAM)	**£6.00**
6264-150nS (8K RAM)	**£32.00**

Z80A 2nd PROCESSOR BOARD for BBC Micro

- Although intended as a BBC add-on, it is totally stand alone (i.e. Can be used with any RS232 Terminal/Computer).
- Z80A Processor running at 4MHZ (No. wait states) 64K Dynamic Memory, 16K ROM space. Disc interface with single/double density, 40/80 track, single/double sided. Two serial channels at independent BAUD rates. Parallel printer interface.
- No additional drives are needed other than those already being used on the BBC as the disk drives can be shared or can be run on the Z80A Processor alone. (This unit can be operated without the disc interface inside the BBC.)
- EXPANSION – OPTIONS
  - IEEE-488 GPIB Interface with Control, Talk and Listen
  - Ram in 64K and 192K increments
  - Hard DISC INTERFACE (to controller)
  - Dual Parallel Interface
  - 8" Floppy Disc Controller
  - Dual Serial Interface
  - Real Time Clock
  - Prototypeboard

(Also another 64K Ram card can be plugged inside the unit)
- CP/M 2.2 – Not a lookalike, making the CP/M Users Group available to you.
- All BBC screen, sound and OSBYTE facilities available to the CP/M user.
- Uses a full intelligent terminal emulator to enable the user to run 99% of all commercially produced CP/M software with no modifications whatsoever.
- Supplied in a standard half height drive case with integral PSU and finished in the standard BBC colour.

All this and more for ONLY **£350** plus VAT.

EPROM PROGRAMMER for BBC MICRO

At last! – the EPROM Programmer for BBC Micro Computer from WATFORD ELECTRONICS that will suit both your pocket and all your requirements. Programs all popular types of EPROMS from 2K bytes up to 16K bytes – **2716 — 2516 — 2532 — 2564 — 2764 — 27128.**
This extremely powerful system is designed for your needs of TODAY & TOMORROW! – BBC Basic programs can be copied into EPROM and subsequently re-loaded faster than from a disc! Suitable for both hobbyist and professional users!

Just look at these features:
- **COMPLETELY SELF CONTAINED –** Housed in its own sturdy case – Uses its own power supply – connects directly to the 1MHz Bus – Simple and Safe!
- **FULL SOFTWARE SUPPORT –** Comes complete with simple to use fully machine code ROM based software and easy to understand manual. Facilities include Varification, Reading, Virgin Testing, Writing, Editing, Saving, Loading and more! NOTE!! – This software does not simply comprise hastily prepared routines to get you going, but is a professional, purpose designed applications package.
- **ACORN BUS COMPATIBLE –** Use of the 1MHz connection complies with all Acorn addressing recommendations – That means you can still add-on such things as the TELETEXT, IEEE 488 TUBE and PRESTEL
- Allows more than one program to reside in an EPROM using the ROM Filing System.

ONLY **£89** incl. Manual (£3 carr)

BEEB SPEECH SYNTHESISER

VERSATILE SPEECH SYNTHESISER UNIT FOR THE BBC MICROCOMPUTER

Watford Electronic's very own Speech System. Specially designed so that even a novice can make his BBC talk:-

SIMPLY the best! – An unlimited speech synthesis system. Complete with easy-to-follow manual. Controlling software is in ROM so no Cassette Loading problems!

PHONEMES for word synthesis – That means unlimited vocabulary! No extra speech dictionary chips to buy!

BUILT-in Library of approximately 500 words to get you started.

ENGLISH accent – Utilises inflexion techniques to produce highly comprehensible speech.

EASY to use system – Just plug the software ROM into a socket, the Speech unit into the User Port, and away you go! No specialised 'dealer upgrade' required!

COMPACT unit – The whole system is built into a small case – easily tucked behind the computer. Auxillary output socket provided for direct connection to an external amplifier.

HOURS of fun! – Suitable for any application – Games, Educational Programs, Specialised Packages.

We know this all seems to good to be true but DON'T BE LEFT SPEECHLESS! Order your Versatile Speech Unit now!

Only £39

Continued ⟶

THE ULTIMATE DFS FOR BBC MICRO

by Watford Electronics

High acclaimed at the Acorn User Show.
What do the independent press say?

Good value for money – *Beebug Aug. '83*
A very worthwhile package – *The Micro User*
You'll be buying a very powerful package – *Personal Computer News*
Superior DFS; Excellent disc sector editor – *Computer Answers*

Without a doubt, the most sophisticated DFS Software yet written for BBC Micro Computer.

This powerful new DFS is fully compatible with ACORN DFS yet has much increased power due to additions, carefully designed to make life easier in normal use. It consists of over 14K of efficiently written machine code. It is entirely self contained and so does not require a utilities disc to function.

- The system can either use the ACORN standard 31 files per disc side or DOUBLE THE CAPACITY to 62 files. The size is selected at formatting time. Copying between discs with different catalogue sizes works perfectly normally.
- A FORMATTING PROGRAM is built in, permitting formatting to 35,40,80 track formats with either 31 or 62 files. Since the formatter is built in to the DFS it can be used without affecting whatever program you are using.
- A DISC VERIFIER is also built in. This checks the internal checksums on each sector to identify any corrupted data. This is extremely useful when saving valuable data as it shows faulty discs quickly and easily. Again it does not affect the program you are using.
- A built in DISC SECTOR EDITOR gives a screen window onto the disc enabling detailed editing of any byte on the disc. This is very useful for recovering accidently deleted files and can save weeks of work.
- A double step mode allows the user of 80 TRACK DRIVES TO READ 40 TRACK DISCS. This mode is software selected for each drive individually, thus allowing a 40 track disc to be copied onto an 80 track one very easily. THIS ELIMINATES THE NEED FOR EXPENSIVE SWITCHABLE DRIVES.
- A WORKFILE function sets the name to be used when the null filename is issued. This allows a program to be edited and repeatedly saved having only typed its name once.
- When using LOAD, CHAIN, etc. it is possible to specify an ambiguous filename. This will result in the first file whose name matches the specification being used. This saves typing the end of a filename that you know is uniquely identified by its first few characters.
- Two commands exist to simplify the transfer of programs from TAPE TO DISC. These load the file to &1100, switch off the disc system and then move the file to its correct load address; thus saving a lot of complicated programming. This command can be used to load files up to 27K75 long.
- An advanced COPY command is included which will prompt the user, requesting whether to copy each file.
- RENAME has been extended to allow the use of ambiguous filenames. This allows you to change BERT1, BERT2, BERT3 to FRED1, FRED2, FRED3 with only one command.
- OPENOUT has been improved to give you fewer annoying 'Can't extend' errors, as it automatically picks the biggest space on the disc in which to put a file. A SPACE command lets you know how much space *COMPACT could create before you waste time doing it.
- 2K of RAM can be reclaimed from the DFS by setting "PAGE" to & 1100.

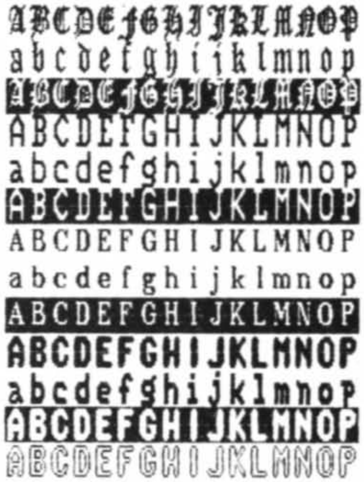
Now with extra features:

- The powerful library system has been extended so that libraries now work on all accesses not only *RUN. This allows you to have a utility directory with all your commonly used programs without muddling in your current workfiles. Very useful for BCPL User.
- Programs can now reside lower in memory by reclaiming some of the DFS' workspaces, indeed PAGE can be taken as low as £1100 under most circumstances.
- To make DFS easy to use, wild cards ("*") have been made vastly powerful, e.g. *INFO

Continued:

BEEBFONT ROM

BEEBFONT is a remarkable new concept in BBC software, exclusively available from Watford. Once fitted, the 16K ROM will enable you to produce attractive text displays in following different styles:



★ **It works in modes 0, 1, 2, 4, using full colour.**
★ Simply use Ctrl–V to select the font and all further screen output will be in a new style.
★ Even the ordinary Beeb character set can be enhanced by doubling height or width and emphasising to give bold print.
★ A comprehensive editor is included which enables the user to design his own characters.
★ A spooling program is provided which enables pre-formatted text files to be displayed on an Epson printer using the full range of character styles.
★ This really must be one of the most original and exciting products of the year.
★ A twenty page manual is provided and the demo/editor software comes on disc or cassette (please specify when ordering). ONLY **£39**

DISC DOCTOR £26

A sophisticated Disc Utility ROM with many useful commands. (For detail description please refer to Computer Concept's advert in this magazine.)

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

only £33

DFS continued:

A gives information on all files in the current directory which have an "A" anywhere at all in their filename.

- Comprehensive and clearly written Manual (available separately) gives the user a complete package deal.
- Fully compatible with BBC TELETEX and TORCH Systems

DFS ROM ONLY **£29**
Complete Disc Interface Kit including DFS ROM and fitting instructions ONLY £95
Comprehensive and clearly written DFS Manual. **£7.50 (No VAT)**
P.S. We will exchange your existing ACORN DFS or PACE (AMCOM) DFS for the highly sophisticated Watford's DFS ROM for
ONLY £25
Watford's DFS is exclusively available from Watford Electronics. We DO NOT retail through any Dealers.

BEEBMON

The most powerful and versatile machine code monitor ROM yet written for BBC Micro. It has all the normal memory editing, moving and relocating facilities, plus all editing is with a full screen editor allowing scrolling up and down memory, entering in Hex, ASCII or standard assembler mnemonics.

In use as a debugging tool, you run code under a total emulation system. Everfelt a desperate urge to set a break point in ROM? No problem – you can even have breakpoint on reading or writing locations in memory and on register contents. The system fully supports debugging of sideways ROMs e.g. BASIC can fully and easily be run from within Beebmon and from there DFS and other sideways ROMs can be used in total emulation mode.

Beebmon can even run itself. In so doing you can nest Beebmon up to a level limited only by the memory size. Beebmon uses 256 bytes of workspace, located anywhere in memory, even on the 1MHz Bus. Beebmon effectively uses no zero page workspace, so your program (e.g. BASIC) can use any or all of the base page. How does it achieve this? By providing a 6502 interpreter all programs running under it exist in a vertual BBC, so special memory locations like the ROM latch are not actually accessed by your programs, instead they alter a location in Beebmon's workspace. Emulation also allows immediate return to Beebmon command level by ctrl-escape no matter what code is being excuted at the time. All this exceptional power and flexibility is complemented by a clear and detailed manual included in a value for money price of:

SPECIAL OFFER THIS MONTH
Only: ~~£25~~ £19

★ NEW ★
DISASSEMBLER ROM for BBC Micro

DISASSEMBLER ROM

Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use programmers tool.

A ROM based machine code Disassembler for the BBC micro. It enables machine code programs to be listed in BASIC/DUMP format and thus is the perfect complement to the built in assembler. It allows Sideways ROMs, files on disk or tape to be listed, and also has a comprehensive editor, allowing mnemonics to be altered directly, as well as HEX, DECIMAL, ASCII and BINARY memory editing. There is also a full set of labelling facilities available (up to 3,200 labels), with the major locations and routines already labelled.

Thus DIS-ASM enables any monitor program, such as BEEBMON to be used to much greater effect as it is not necessary to disassemble memory each time the display is altered.

All these and other facilities for ONLY **£16**
(Price includes a comprehensive manual and fitting instructions.)

FORTH ROM for BBC

This superb (FIG FORTH) compiling language now available in ROM. Simply plugs into one of the ROM Sockets. Manual included. **£34**

VIEW

Acorn soft's Wordprocessor ROM. **£52**

★ NEW ★
FX80 PRINTER DRIVER for VIEW

Do you want to use Italics or Enlarged Characters with View? French or German Characters? These and other FONTS from FX80 character sets can be accessed using our Printer Driver with VIEW. The disc contains an example as well shows how to use. Available on 40 or 80 track Disc. **ONLY: £7.50**

ACCESS ORDERS BY TELEPHONE
Simply phone your order through. We do the rest

(0923) 50234/40588

BEEB PRINTER ROM

"Makes Printing Childs Play"

Are you fed up with not being able to unravel your printer manual and use all those features you paid for? Need sensible paging for use in the creation of booklets? Then you certainly need our Beeb Printer ROM.
A machine code printer utility in ROM.

★ 'Single' key operations replace control code sequences for underline, front and size selection, paper movement, etc. Up to 30 come pre-defined, without effecting normal fn key usage.

★ Automatic fanfold page margins. Puts gaps in listings. PRINTed text etc to skip the folds. The gap size alternates to minimise paper wastage when using binders.

❊ Form feed and related commands, made available on ALL printers. Can also provide a left margin.

★ User defined characters embedded within text are printed as on VDU.

★ ★ Commands select option for GP100, STAR, NEC, MX/FX, LP VII/DMP100, DMP200. Operates with parallel interface printers and is turned on by *FX5,3.

Supplied complete with Manual.

Price: £24

(When ordering, please specify the make of printer you have.)

TWO NEW GRAPHICS SCREEN DUMP ROMS from WATFORD

DUMP OUT 2

A versatile machine code hi-res Screen Dump ROM.
- You can now have small or large 2 tone dumps and multi-tone 'colour' pattern dumps (8 distinct mode 2 shades) on every printer.
- *Commands initiate the required dump optional parameters may be included for colour masking and selecting the part of the screen to be dumped.
- Clever use of the processor stack means that no workspace is required! (Multitone dumps also use 2 zero page locations.)
- For GP80/100/250, STAR, NEC, EPSON MX/RX/FX, LPVII, DMP100/120/200/400.
- Screen modes 0, 1, 2, 4, & 5.
- Instruction Manual

All this for ONLY **£15**

EPSON DUMP ROM

Will accurately DUMP all Screen modes including TELETEXT, GRAPHICS and DOUBLE HEIGHT. MULTITONE DUMPS are also supported. Simple single command (*SCDUMP) operation. **Only: £16**

DISC EXECUTOR

Disc Executor is a sophisticated disc utility, designed for the BBC Micro, which allows you to transfer almost all of your tape software to disc. It will handle 'Locked' programs and allows you to load full length adventure type programs (i.e. up to &6E blocks) from disc in seconds rather than minutes. Available in 40 or 80 track, please specify.

Price: **£12**

WATFORD JOINS THE COMMUNICATION REVOLUTION

MODEM 84

Prestel(TM)

A British Telecom Service.

With the launch of Watford's MODEM 84 you can now hook into PRESTEL, MICRONET, HOMELINK, TELECOM GOLD, etc., for about the cost of a good tape recorder. Prestel gives you access to an incomparable database covering almost every subject under the Sun. There is Micronet with lots of free programs that you can download and run. Details of Clubs and User groups, a diary of meetings and exhibitions, news and reviews, technical information, etc. There is Homelink with On-line banking. And there is armchair shopping, travel information, Entertainment, World News, Sports News, Business News, Weather information, Electronic mail and lots more. The basic Prestel subscription is only £5 per quarter for domestic user and at off-peak times there is no charge for access time. Can you afford not to be part of this revolution?
Now using the latest techniques and the new generation of Modem chips, Watford have developed a Modem that is newer, better and yet cheaper than any on the market.

Compare the Specifications:

MODEM

- Direct-connect Modem using BT approved isolation components.
- Full Duplex V23 operation for Prestel and TELECOM GOLD operation (1200/75 Baud).
- User-to-User half duplex 1200/1200 Baud operation with AUTOMATIC SEND/RECEIVE switch (BEWARE – most MODEMS switch manually between send and receive, which precludes the use of intelligent user-to-user software).
- Simple single button operation and comprehensive LED status display.
- Attractive Beige case to match your Micro. Sized to sit on the disc drive.

NEW SUPER PRESTEL INTERFACE ROM

Fully compatible with Watford's MODEM 84 as well as with PRISM and most other Modems.
- Supports full Prestel Colour Alpha and Graphic Characters including Double Height, Flashing, Conceal/Reveal.
- Called by simple *PRESTEL command. Disc and Tape configurations fully supported.
- Telesoftware downloader included.
- Comprehensive MAILBOX facilities including offline editor.
- Auto Logon sequence, can be burnt into ROM if desired.
- Unique "TAG" facility allows tagging and recall of interesting pages – avoids the common and annoying 'NOW WHERE WAS THAT PAGE' problem.
- Page load and save to tape or disc. Pages are automatically saved under Page Number reference in a 'FRAME' directory.
- Print page options are ASCII only (i.e. with supression of Graphics) – fast and works with any printer – as well as a full graphics dump for the popular Epson printer.
- 'USER' function call built into interface with specialist add-on routines (your own as well as ours).
- All the above facilities available from Function Keys. An overlay is provided giving simple yet comprehensive guidance to the key functions.
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SEA

By STEPHEN LOVICK

YOUNG Ben has to build the sea wall before the tide comes in. He needs five bricks to do it but the demon maths master will only provide him with bricks if he gets the answer right.

If he makes too many mistakes, the dreaded octopus will get him. But if he succeeds the positions are reversed.

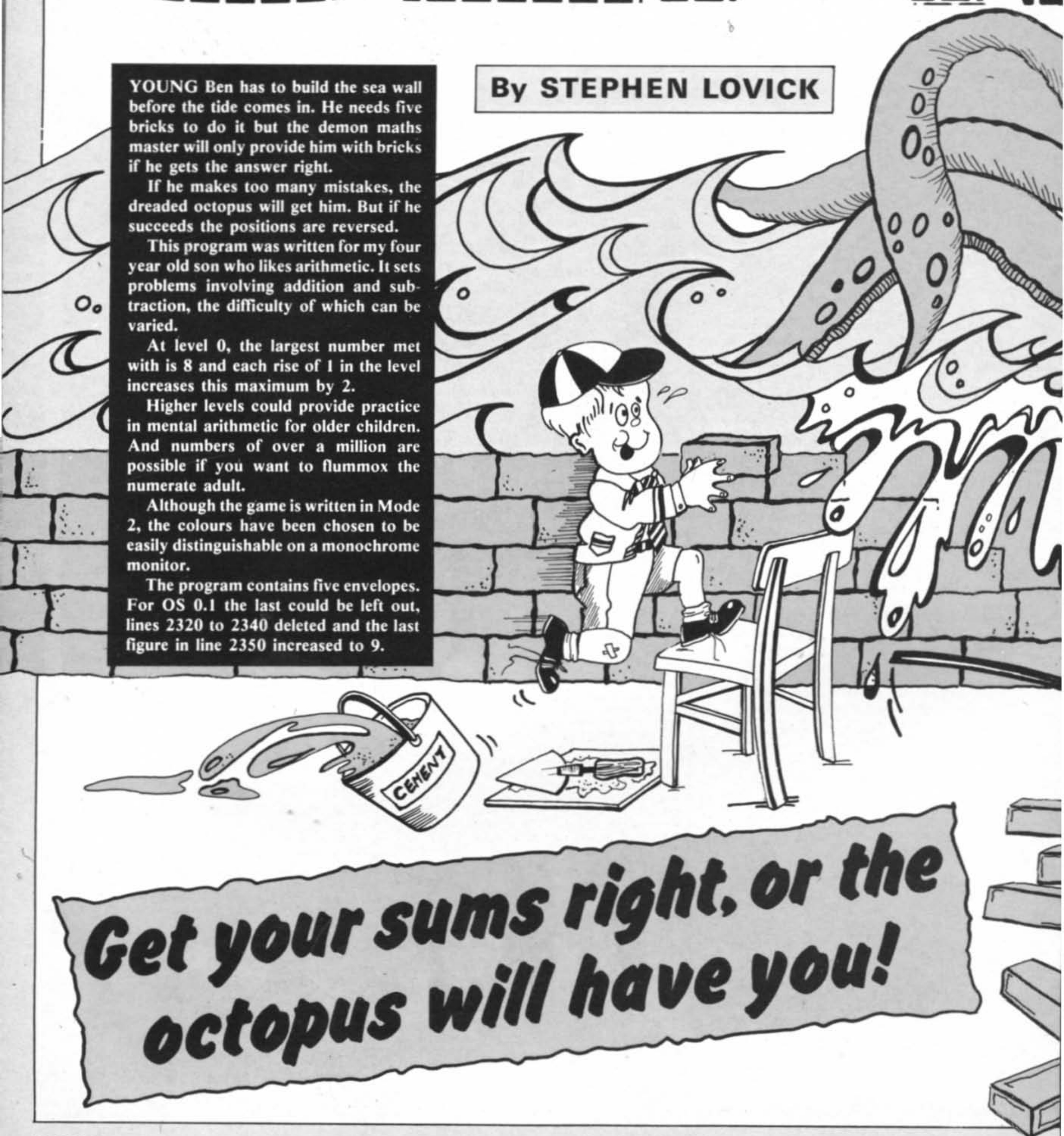
This program was written for my four year old son who likes arithmetic. It sets problems involving addition and subtraction, the difficulty of which can be varied.

At level 0, the largest number met with is 8 and each rise of 1 in the level increases this maximum by 2.

Higher levels could provide practice in mental arithmetic for older children. And numbers of over a million are possible if you want to flummox the numerate adult.

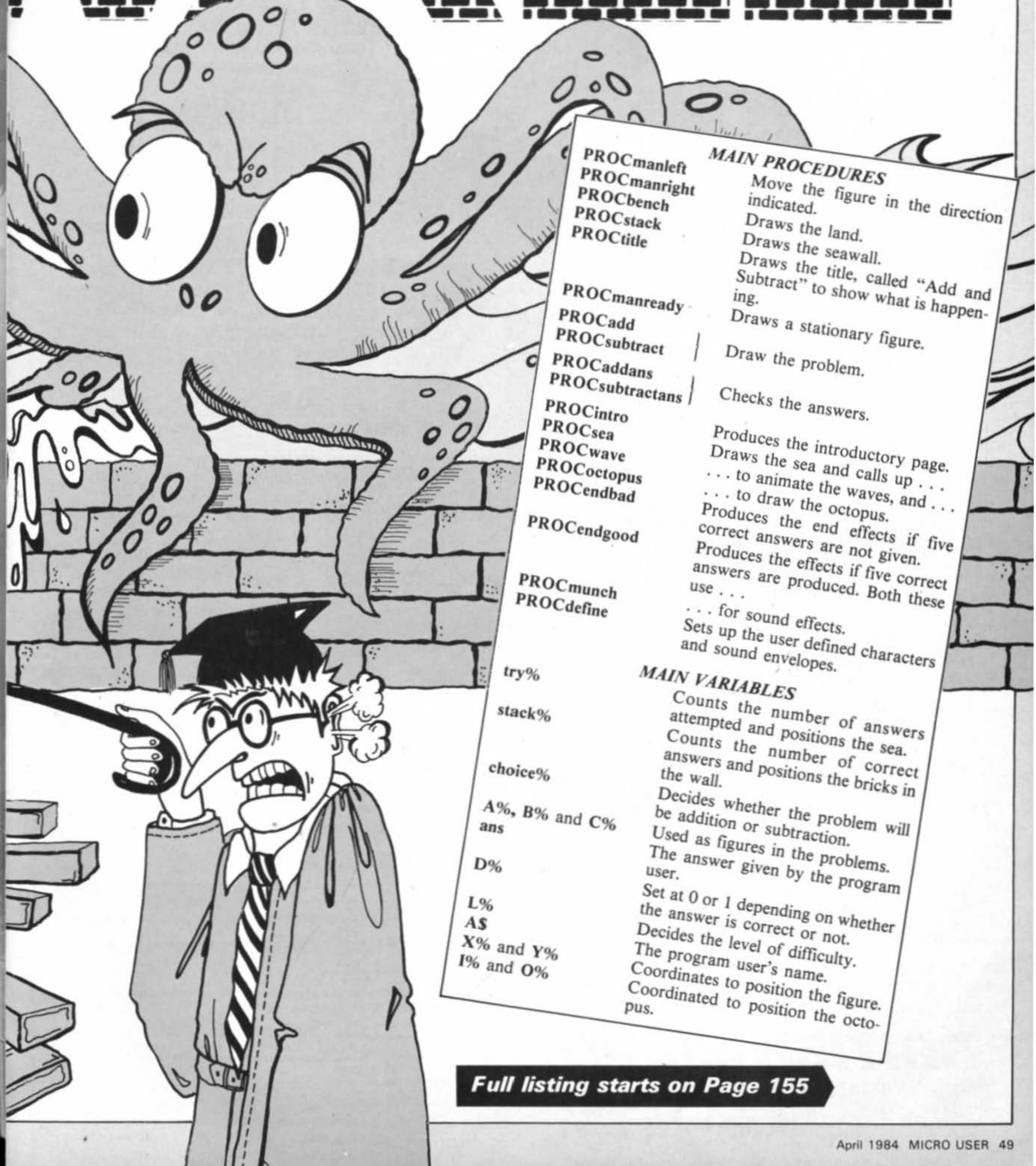
Although the game is written in Mode 2, the colours have been chosen to be easily distinguishable on a monochrome monitor.

The program contains five envelopes. For OS 0.1 the last could be left out, lines 2320 to 2340 deleted and the last figure in line 2350 increased to 9.



Get your sums right, or the octopus will have you!

WALL



MAIN PROCEDURES

PROCmanleft **PROCmanright**	Move the figure in the direction indicated.
PROCbench	Draws the land.
PROCstack	Draws the seawall.
PROCtitle	Draws the title, called "Add and Subtract" to show what is happening.
PROCmanready	Draws a stationary figure.
PROCadd **PROCsubtract**	Draw the problem.
PROCaddans **PROCsubtractans**	Checks the answers.
PROCintro	Produces the introductory page.
PROCsea	Draws the sea and calls up . . .
PROCwave	. . . to animate the waves, and . . .
PROCoctopus	. . . to draw the octopus.
PROCendbad	Produces the end effects if five correct answers are not given.
PROCendgood	Produces the effects if five correct answers are produced. Both these use . . .
PROCmunch	. . . for sound effects.
PROCdefine	Sets up the user defined characters and sound envelopes.

MAIN VARIABLES

try%	Counts the number of answers attempted and positions the sea.
stack%	Counts the number of correct answers and positions the bricks in the wall.
choice%	Decides whether the problem will be addition or subtraction.
A%, B% and **C%**	Used as figures in the problems.
ans	The answer given by the program user.
D%	Set at 0 or 1 depending on whether the answer is correct or not.
L%	Decides the level of difficulty.
A$	The program user's name.
X% and **Y%**	Coordinates to position the figure.
I% and **O%**	Coordinated to position the octopus.

Full listing starts on Page 155

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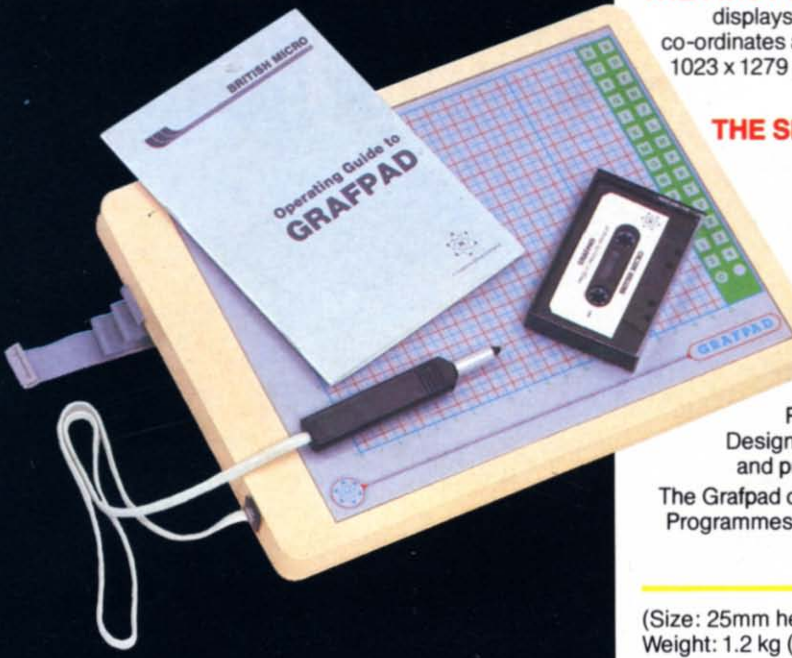

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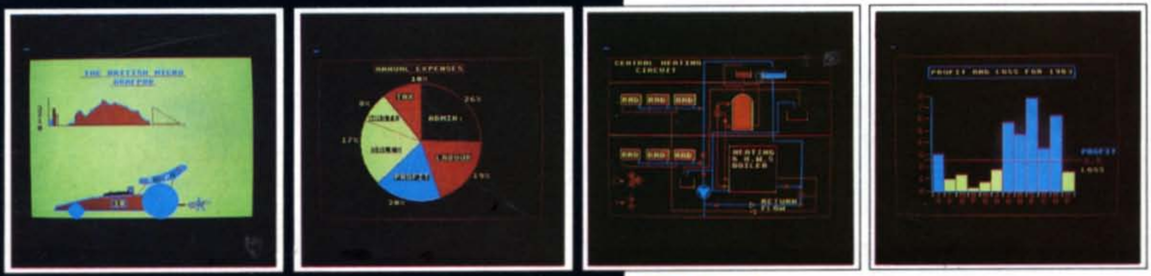

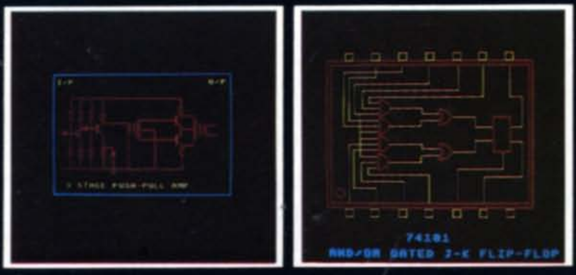

(The above designs were drawn by a 12-year-old at our showrooms!)

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EDUCATION SOFTWARE MUST BE ENTERTAINING

IAN MURRAY, continuing his series, looks at how amusing software aids education

SO now you can program! If you've been following *The Micro User* recently you will have learnt about the dreadful tricks and button pushing that youngsters get up to. And you will have learnt how to structure your keyboard entries to direct your user to do what you want him to do.

Suddenly you are left with a clever piece of software which is well structured, educationally valid – and dead boring. Oh dear!

You are not alone. As the wrapping gets glossier on the computer cassettes in the shops, it seems that a lot of the contents get shoddier.

The commercial artists do a great job with zapping rayguns, bug-eyed beasts and roaring rocketry on the covers. But once the outer plastic has been ripped away the story is a little different.

Complicated instructions and poor graphics make the consumer feel very hard done by. This isn't always true, but good and entertaining software stands out.

Sadly very little educational software is at all entertaining.

Lots of teachers, and many parents, think that they cannot be learning from the computer if a "game" is involved or if the student is enjoying the experience.

For some reason true learning has to be painful, a pill that is always slightly too large to swallow.

Nonsense! Learning is fun and good educational software must entertain.

The BBC Micro has three main areas in helping the programmer to entertain the user:

- *Colour*
- *Graphics*
- *Sound*

The human brain was originally the brain of a hunting animal that had to react to changes in shape, colour and movement of its prey. And we still respond best to such changes.

Anything that you, the programmer, want the user to notice must stand out as different and exciting.

Most of your software will need a menu and instructions. I suggest that these are best written in Mode 7, which gives you a lot of memory space and access to the eight flashing and non-flashing colours. But you do not have the opportunity to define your own characters.

Do not print a menu or instructions straight onto the screen. That's all right for business software, but not for what we are trying to do.

Build up the menu and instructions over a short period by printing the menu line by line or even letter by letter. This way the user's eye follows the build up and he is more likely to take notice of what you are putting on the screen.

Listing I is a procedure which takes a string of characters, which could be a whole line, and prints them bit by bit.

```
 1000 DEF PROCMove_letters(A$,
Time_delay)
 1010 LOCAL X
 1020 FOR X = 1 TO LEN(A$)
 1030 PRINT CHR$(128+RND(6))
MID$(A$,X,1);
 1040 PROCWait(Time_delay)
 1050 NEXT
 1060 PRINT
 1070 ENDPROC
```

Listing I

To run it you will have to write a short time delay procedure such as shown in Listing II.

Then at any time in your program you can summon up the procedure by using Listing III.

You will notice that line 1030 throws in some random Mode 7 colours for added effect.

```
6100 DEF PROCWait(Seconds)
6110 LOCAL Finish_time
6120 Finish_time = TIME + 100*Seconds
6130 REPEAT
6140 UNTIL TIME > Finish_time
6150 ENDPROC
```

Listing II

```
10 A$ = "Try to work out"
20 B$ = "the number I am"
30 C$ = "thinking of !!!"
40 PROCMove_letters(A$,.1)
:PROCMove_letters(B$,.1)
:PROCMove_letters(C$,.1)
```

Listing III

This is needed or the user may suspect that there is something wrong with the BBC Micro if it is printing out letters a little slowly. It does however put an extra space between each letter occupied by the hidden colour code.

It is also useful to design a standard double height Mode 7 character procedure. Double height characters stand out and are very useful for sudden important messages and reprimands, as well as the more usual titles.

However they can only be used in

→

A BBC WORD PROCESSOR TO REALLY TAKE ADVANTAGE OF YOUR DISC DRIVE.

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Merlin Computer Products
SCRIBE v1.30
Merlin Scribe
A word processing programme
Software for the BBC Computer
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MANUAL
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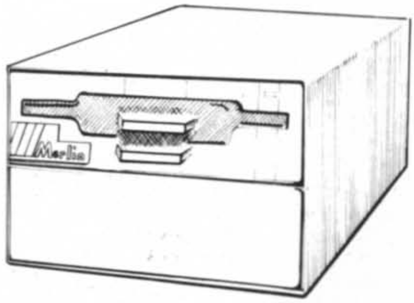

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A superbly comprehensive version of this educational asset. This is a graphics version - each instruction controls the movement of a pen on screen. Each program produces a picture.

•Vocabulary of over 50 instructions. •20 pre-set shapes (sprites). •Printer screen dump and Program listing. •Super editor. •Colour and scale choice. •Error diagnosis. •Use variables. •Use BASIC expressions. •Show results of calculations. •Draw on compass-bearings, colour-fill, draw circles etc.

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Includes full Instruction Manual with Teaching examples.

VISA

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Access

See us on Stand 57

EDUCATION
SOFTWARE
MUST BE
ENTERTAINING

From Page 51

Mode 7 and can be expensive on memory, as all text has to be printed twice to get the double height. A suitable procedure to get round this is shown in Listing IV.

```
 7000 DEF PROCu(x%,y%,w$)
 7010 LOCAL z%
 7020 FOR z%=0TO1: PRINT TAB(x%,y%+z%)
CHR$141;w$
 7030 NEXT
 7040 ENDPROC
```

Listing IV

Words can of course have colour codes and a flashing code built into them.

With younger users it is often very useful to take in data in double height characters. It's easy on the eye and more immediate. You will have to take each character in individually and then print it double height.

You will have gathered that any software which produces moving images and allows the user to play and react to moving images is going to be much more entertaining than boring old writing.

However, it is perfectly possible with even fairly simple spelling and Hangman type programs to introduce good graphics. At the risk of being ghoulish, a winking hanged man will entertain much more than the creation of a stick hangman.

To produce such winking, all you have to do is define your own two characters – possibly four – and print the open eye on top of the closed eye.

All introductions need some warm up graphics. A monster might escort each letter of the title onto the screen along with the letter move procedure.

It will put your user into a friendly frame of mind when dealing with your software. It might even cover up some fairly trivial learning point which you wanted to reinforce.

If your software involves some interactive graphics between machine and user have a routine where the machine plays itself. There is always a time in learning when one wishes to sit back and watch, and one can learn by watching as well as by playing.

Make your machine seem human. Youngsters relate to the computer as if it were alive. They get pleasure from beating it – so let the youngsters win from time to time.

Always get the name of your user and store it for future use. Perhaps you might like to add a name guessing routine to your introduction.

This is fun, doesn't take up much memory, and always leaves the user baffled – if the guess is right. See Listing V.

```
 7100 DEF PROCName_guess
 7110 PRINT"Are you a boy or a girl?
":
 7120 REPEAT: A$=GET$
 7130 UNTIL INSTR("bBgG",A$) <>0
 7140 IF INSTR("bB",A$) <>0 THEN
PRINT" a boy": RESTORE 8000 ELSE PRINT
" a girl": RESTORE 8500
 7150 READ n%: REM number of random
names
 7160 FOR X = 1 TO RND(n%): READ
Name$:NEXT
 7170 PRINT'"Is your name "Name$" ? ";
 7180 PROCAnswer
 7190 IF YES PRINT"I thought so!":
GOTO 7230
 7200 PRINT"Sorry, my fault, I'm
sleepy!"
 7210 INPUT"What is your name then ? "
Name$
 7220 PRINT
 7230 PRINT"Nice to meet you "Name$
 7240 ENDPROC
 7400 DEF PROCAnswer
 7410 LOCAL Ans$
 7420 REPEAT
 7430 Ans$ = GET$
 7440 UNTIL INSTR("YyNn",Ans$) <>0
 7450 IF INSTR("Yy",Ans$)=0 THEN
NO=TRUE: YES=FALSE: PRINT" No" ELSE
YES=TRUE: NO=FALSE: PRINT" Yes"
 7460ENDPROC
 8000 DATA10
 8010 DATA MIKE
 8020 DATA PETER
 8030 DATA ALAN
 8040 DATA DAVID
 8050 DATA LEROY
 8060 DATA JUNIOR
 8070 DATA JOHN
 8080 DATA JAMES
 8090 DATA IAN
 8100 DATA GRAHAM
 8500 DATA 10
 8510 DATA SUSAN
 8520 DATA MARY
 8530 DATA LORRAINE
 8540 DATA DEBORAH
 8550 DATA JOAN
 8560 DATA ERICA
 8570 DATA NORMA
 8580 DATA BETTY
 8590 DATA BETTY
 8600 DATA LIZ
```

Listing V

Sound is almost as important as moving images. It is good practice to program two sound channels with a friendly and an evil sound.

For every successful data input – even for an individual letter – play out the friendly sound.

Many children have difficulty reading, or attempt things a little beyond themselves so as to stretch their learning, and a soft reassuring sound boosts confidence.

You can always go overboard with whole tunes for success, but it does involve some quite complex music programming.

The evil sound needs to be no more than a good "splattt" – enough to wake up the user and encourage a better response. Sounds add the human touch.

Though all this adds to the user friendliness of your software, at the final count the software itself must be useful and fun.

No amount of friendly cover-ups will hide bad software. But I hope that some of the tips here will mean some of you abandoning pages of screen instructions in Mode 0 and that at least your software will seem nice, even if it isn't educationally perfect.

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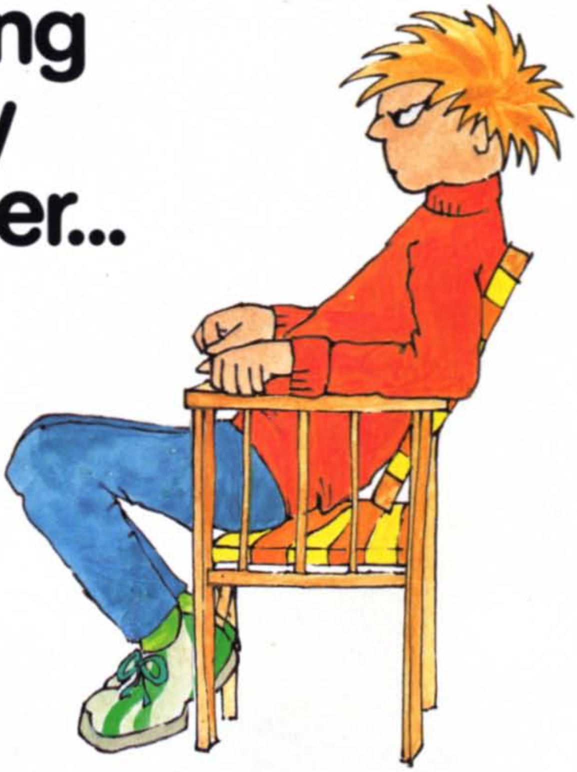
Sometimes even the best of friends need something new to say to each other...



“I want

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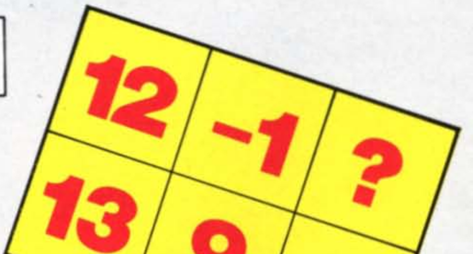
ADD A TOUCH OF MAGIC TO YOUR MATHS LESSONS

By IAN MURRAY

This simple adaptation of a classic puzzle puts a sparkle into mental arithmetic



THIS lovely little program generates magic squares and uses them to teach simple mathematics. It uses Mode 7 graphics, screen windows and music very effectively and is extremly robust.

Adults have found the little game as entertaining as the youngsters, though their attention may not last the full half hour.

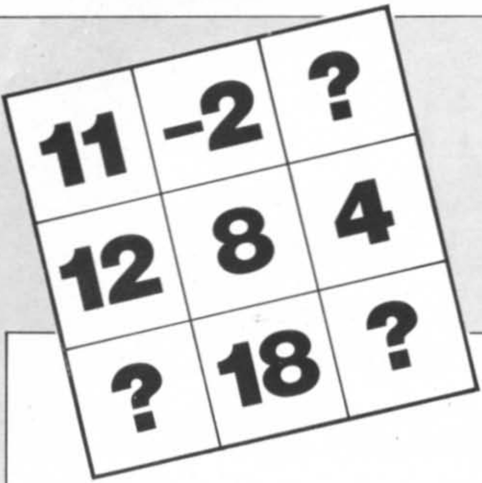
The Return key should be used with all inputs except when a screen message requests otherwise.

No data input can crash the program, but there are a couple of meaningless inputs that involve the divide sign or minus sign. The program will either treat these as a wrong answer or give you an appropriate message.

The program should be left by the "proper" exit at the end of the program but pressing Control and Break will get you out of it – if you so wish. It will assume you want to play again unless you type N, n or no.

Here is a detailed description of the program:

Lines	
0-25	The main program structure. Lines 2 and 3 turn off the escape key and cursor control keys. Lines 13 and 14 update the screen and accept the next move.
26-51	This algorithm constructs the magic square and holds it in the A array. The B array is used to dump the magic square to the screen while the A array is used to validate user answers, etc.
48-50	These generate the magic square positions which have to be solved. No checking is done that three unknowns are in a diagonal line, which means that once in a while the square can be quite hard to solve.
52-68	The screen dump routine.
60-64	Tabulation corrections.
69-84	The general routine to accept your move. It calls up the input function, checks your response for the correct answer, calling the appropriate procedures as required.
85-91	Self evident.
92-100	Display, music and time routines congratulates your success on winning.
101-111	Congratulates your single successful guess. Line 108 restores the music data (essential).
112-120	This routine is not so pleasing. If you bump into it you have failed to make a good guess.
121-130	The chime routine. It calls the music of the routine in line 101.
131-155	Introductory routine. If you are going to use this in schools as an educational game, this part of the program is most important as it is structured to teach the fun and maths behind the magic square.
156-161	Self evident.
163-186	The input function. Great care has been taken on input validation to make the program nearly 100 per cent robust. Nothing will crash the program. Only a maximum of three characters can be input and these can only range from the Ascii codes for minus sign to the Ascii code for 9. Delete and Return are specifically enabled. In this character code range are also the quotes and slash sign and these have been catered for.
187-end	A standard time delay routine set for a half second.



Full listing starts on Page 148

FUNCTIONS

Input parameters specify highest and lowest Ascii and number of characters that may be input.

The input is a general purpose routine which can be patched for a number of other uses. Line 184 determines the conditions on which the function will return its value.

PROCEDURES

PROCi	Introduction.
PROCs	Initialise and set up square.
PROCp	Screen display of square.
PROCa	Accept user's move.
PROCd	Complete square solved.
PROCg	Play again routine.
PROCr	Got the move correct.
PROCw	Got the move wrong.
PROCz	Sound the chimes.
PROCm	Do a delay.
PROCu	Continue routine.

VARIABLES

K	Flag.
M	Number of correct numbers displayed.
J	The number of guesses.
X	Controls print-out tabulations.
d	Delete character.
r	Return character.
e	Input character.
c	Used in input length of string.
num	Number of characters to be input.
f	Final time on delay.

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BBC COMES OF AGE..

β-BASE: (Ring for availability)

β-BASE is a very powerful and very flexible database program. Because β-BASE is designed specifically for disks there are none of the limitations found in most database programs, which are usually upgraded cassette programs. β-BASE is not limited by memory and even the disk limit can be overcome easily to provide an unlimited file size. Take a look at the features listed below and compare it with so called professional programs at up to £400, we think that you will be amazed.

Maximum File Size (40 track) - 99k & (80 track) - 199k.
Maximum Record Size - 2k: Maximum Number of Fields - 200:
Maximum Field Length - 254 chrs.

Options Include:

1) WRITE - for adding records.
2) WORK - for displaying records, editing and deleting.
3) CALC - allows you to cope easily with fluctuating prices and VAT rates. (works with whole file or search lists). Uses EVAL function allowing complex calculations to be performed, and the results to be displayed on screen or placed in a nominated field.
4) SEARCH - multiple function search on up to 5 fields.
5) OPTIONS:
   a) sort records found in search on 3 fields in ascending/descending order + set number of chrs to sort on (max records sorted is 500).
   b) work search list, with edit and delete.
   c) save records found in search to disc.
   d) load previously saved search for re-search etc.
   e) make a search list.
6) PRINTER - copes with parallel and serial printers and allows you to set up the printout + all printer codes allowed + allows you to join fields together and allows you to set them into columns etc. A label print routine allows single or double labels to be printed.
7) REDEFINE - allows you to transfer all records from old file to new file plus add or amend field or record size. No more re-entering all your data if you wish to add a field.
8) TRANSFER - allows you to transfer selected records between files.
9) NEW - allows you to define new file.
   + real time clock + many more features.

If you want a professional database for the BBC micro the β-BASE is your only option.

REPLICA II: £12.00

This is the one that everybody has been waiting for. The original REPLICA set a very high standard and many said that it could not be improved. The specification that we set our chief programmer included some supposedly 'impossible' features. In fact ACORN state that some of the things that we have done are impossible, it just took us a little longer that's all. REPLICA II will transfer most of your cassette based programs to disk, even more than REPLICA did. Now when you buy disk drives you do not have to throw away your expensive cassette based programs. REPLICA II will transfer 'LOCKED' programs, programs loading as files, programs that load below &E00, those with up to 6 sections and those up to &6E in length eg adventure programs. No more waiting for 6 minutes whilst your adventure programs load. REPLICA II is very easy to use and the user just enters a name, how many sections and whether CHAIN, *RUN or *LOAD is used to load the first section. Press play and let the program do the rest, even a menu. You cannot afford not to have a REPLICA II, think how much it will cost you to buy just 1 disk version of your favourite program – it is probably more than REPLICA II which will hold up to 16 programs, limited only by the disk capacity.

BEEBSYNTH: disk £11.00 cassette £8.00

A very powerful yet easy to use sound generating program that can be used by expert and novice alike. Up to 16 envelopes can be defined and saved. The envelope definer is very easy to use, control is through the cursor keys, and the effects of your changes can be heard immediately. When you have defined your envelopes press 'K' for Keyboard and the keyboard is transformed into a musical instrument, but you control which instrument. Lets you play chords, not just single notes, change pitch and duration etc etc. A superb program that you can use immediately. Unlimited sounds at your disposal. Recommended by MICRO USER, PCN, HCW etc.

THE KEY: £12.95

A disk utility program that provides the user with the tools to explore the disk environment and use it to its best advantage. The programs are:

1)	FORM40	- Formats and verifies 40 track disks.
2)	FORM80	- Formats and verifies 80 track disks.
3)	BACKUP	- Allows backup copies of your valuable disks to be made.
4)	EDITOR	- Enables the user to read the disk sector by sector and to alter programs on the disk, even most protected and unlistable ones. More fun than any adventure game.
5)	RETRIEVE	- Allows the user to recover data or programs that have been accidentally erased or damaged by a head crash.

Every disk owner should have one, you will wonder how you ever managed without it. Recommended by WHICH MICRO, EDUCATIONAL COMPUTING etc.
'THE KEY' has been imitated by many but bettered by none.
NOTE: All disk software is now available on 3" disks. Just add £3 to the printed prices. Ring for prices of special deals e.g. any 2 programs on same disk.

available at larger Boots

JOYSTICK UTILITY: £6.00

Converts non joystick programs to work with joysticks. Works with any program using INKEY (-) in Basic or machine code, to detect movement, which applies to most programs. The routine is relocatable and sensitivity of the joystick can be varied. Compatible with most games, including Acornsoft. Very easy to use, just press the keys you want to transfer. The machine code can be saved as a block of just 100 bytes. Supplied on cassette but can be transferred to disk.

available at larger Boots

SHADOW: £8.00

SHADOW is a tape cloning program that will enable you to make security copies of your own valuable cassette software. SHADOW works with 99% of all known programs including those with sections at 300 BAUD and those that load as files. SHADOW will handle programs with any number of sections and it will work with any of the current operating systems including 0.1, 1.0, & 1.2. SHADOW is the definitive tape backup system and as a bonus you also get 'INSPECTOR' on the same tape. This allows you to view all areas of memory, search and alter bytes, etc. Colour coding helps to simplify memory usage. All this for just £8.00, I don't know how we do it. 'It is a condition of sale that this program is not used for piracy".

GRAFKEY/GRAFDISK disk £12.95 cassette £9.00

The 'GRAF' series of programs are, to our knowledge, the cheapest entry to the CAD (Computer Aided Design) field on the BBC micro. Input is by either joystick or keyboard. All graphics modes can be used and altered whilst running, the functions provided are: Line, rectangle, triangle, circle, text (upper and lower case), paint and colour pallet (8 colours and flashing). Drawing aids include: Alignment grid, circle copy, delete, free memory, purge memory, variable cursor speed, clear screen and redraw. Save drawings to tape in about 20 seconds or to disk in about 2 seconds. Rubber Band is a very flexible line drawing facility and has to be seen to be believed. Pictures can be saved and included in your own programs, very easily. GRAFDISK also provides a screen save facility. Recommended by BBC MICRO USER, PCN, ELECTRONICS & COMPUTING, LASERBUG ect, used by universities, colleges and business, as well as the enthusiast.

SINGLE KEY: (requires 1.2 O.S.) £5.00

SINGLE KEY ENTRY provides the user with single key entry of all 66 keyworks on the BBC micro. Speeds up your program input, it's just like having 66 function keys and it only occupies 256 bytes. Compatible with BASIC 1 & BASIC 2.

EDUCATIONAL PROGRAMS

THE GARDEN: £8.00

A series of three programs to help children with colours, spelling and recognition. The three programs cover three overlapping age ranges from bright four year olds to eleven year olds. The first level concentrates on colours and requires a simple Y/N answer to a question. The other two levels are orientated towards spelling and sentence structure. A sentence is presented with a missing word and the child is required to choose the correct word from a list and then type it in. Using this method each exercise involves a sentence, three words and picture/word relationships, all of which help to expand the child's vocabulary and understanding. Excellent graphics are used to reinforce the teaching. All three programs are provided on each tape and are compatible with disks.

COUNTING: £6.00

Like 'THE GARDEN' this program uses good graphics to interest the child whilst engaged in learning. Various levels can be chosen with a maximum number of 20. Aural stimulation can be selected if required and allows the child to do the counting in various ways, it can even be done with eyes closed. The objects for counting are rockets that blast off, flowers which bloom, jack-in-the-boxes that jump etc, and are usedto stimulate interest. Makes counting fun.

TAKE-1: £6.00

TAKE-1 is by John Sekula, the author of the acclaimed COUNTING program above. This new release concentrates on subtraction and again uses excellent graphics including sideways scrolling to gain the child's interest. Suitable for children counting up to 20 but the graphics are suitable for all. Recommended and praised by many teachers and parents. Give your children the start they deserve.

MATCHING: £7.00

A bumper tape of four programs covering numbers, words, shapes and patterns. Graphics have been deliberately minimised to avoid distraction from the subject. They are ideal for infants and pre-school children. 'NUMBERS' provides various levels and alternative methods for counting. The space bar can be used as a counting stick and a visual and aural reward is given. 'WORDMATCH' again has various levels and the child is required to match the subject word with its partner which is in the displayed list. There is a choice of moving the word or moving the marker. 'SHAPE MATCH' can be of use to all ages and has a wide difficulty span. The cursor keys are used to move the subject shape onto the correct match and they will then merge if the answer is correct. 'PATTERN MATCH' is similar to 'SHAPE MATCH' but colour patterns are the subject instead of the geometrical shapes. This program introduces shape, colour and relational concepts and can even be of help in detecting colour blindness, although any suspicions should be confirmed by an expert.

INTRO: £10.00

INTRO is a simple computer programming language which uses the immediate visual response of 'turtle graphics' to introduce a number of programming concepts and techniques and to illustrate a variety of mathematical ideas in the areas of measurement, pattern, angle, and the use of variables. INTRO is similar to LOGO but with some important and deliberate differences. The most obvious is the screen layout which sets a section of the screen aside as a scratch pad with room for instructions to be displayed. Another important difference is in the way procedures are defined, in LOGO you must decide before typing in the procedure but in INTRO the current program can be stored as a procedure by typing STORE NAME, or whatever. INTRO has a very full instruction set, permitting great flexibility in handling graphics and in addition allowing access to the BBC's mathematical functions, INKEY etc. Programs and procedures can be saved to tape just like normal programs. INTRO is supplied with a comprehensive nineteen page manual as well as demonstration programs on the tape. INTRO can be transferred to disk but files must still be loaded and saved on tape.

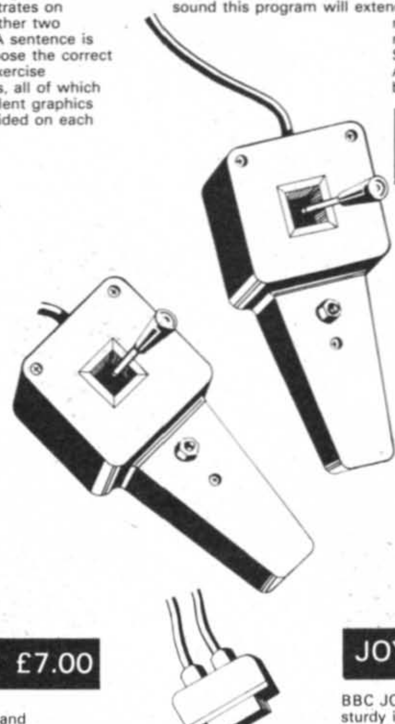
HUE-MEN £6.00

Designed and written especially for pre school children this program is loved and admired by everybody that sees it. It has proven a big hit with children and adults alike and no collection is complete without a copy of HUE-MEN. This program is the best example of animation in MODE 7 seen to date, yes MODE 7. We cannot praise this program too highly and it is actually educational too. The subject is colour and HUE-MEN succeeds in extending young children's attention span without the teaching element even being noticed. Recommended for children of all ages.

SHAPE-MEN: £6.00

SHAPE-MEN is by the same author as HEU-MEN, Phil Reynders, and uses similar concepts to aid in shape recognition. Again using MODE 7 and sound this program will extend the child's attention span considerably. A real must and both these programs are recommended by PRIMARY EDUCATIONAL SOFTWARE REVIEW.

ALL educational software is supplied on tape – but can be easily transferred to disk.



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TWIN KINGDOM VALLEY **THE FIRST GRAPHIC ADVENTURE FOR YOUR BEEB!** Not only is it a good adventure, but all 175 locations are drawn in hi-res graphics - and some of the beautiful drawings contain clues. 36 commands: plain English input: realtime adventure with 6 control options. The most sophisticated (and the prettiest) adventure we've ever played on our Beeb. NO STIX **(Bug-Byte) £9.50**

CYLON ATTACK *"OUTSTANDING ... Quite simply excellent ... the graphics leave most other games standing ... sets the standard by which action games will be judged" (Micro User)* It is pretty staggering - so are the 3D graphics. You will believe you are launching from and docking with a mothership: you will see and feel you are refuelling. You will know just when you can kill the enemy as your sights change shape.
UNIQUE 50-PLACE HI-SCORE TABLE CAN BE SAVED FROM GAME TO GAME. Now why don't all the programs do that - it's a great idea. STIX O.K. **(A & F) £7.90**

TRAFALGAR Totally original new game, as you command your way through the graphic battle of Trafalgar. Great full-screen overhead line-of-battle pictures, as you choose your enemy ship and then sea-level viewpoint as you watch the two ships fight to the death. 1 or 2 players: FIRESHIPS can be launched (and blown up, if you're smart): your broadsides are very controllable and the graphics are very watchable. It makes a nice change from the space race. STIX O.K. **(Squirrel) £8.00**

SNOWBALL *"The puzzles are logical and the program is enthralling ... well worth the money" (MicroAdvent)* The greatest ever text adventure. Over 7 thousand locations! As Kim Kimberley, agent extraordinary, you must safeguard Snowball 9. 700 messages: vocab over 200: every object has a purpose! Written in super-compact a-code. Helpful manual. NO STIX **(Level 9) £9.90**

TRANSISTORS REVENGE *"Clever idea ... noisy, fast, colourful and compulsive" (YrComp)* Original: great sound and action: good full-screen graphics. The game is set inside your computer as you guard the CPU from the attacks of the chips! 50 alien chips on each sheet: every 4 levels, life gets harder! You choose whether to continue with a game or enter the hi-score ladder. NO STIX **(SoftSpot) £7.95**

THE HOBBIT *"Sheer adventure .... a must for all aspiring adventurers." (CompAnswers)* At last a BBC version of one of the greatest adventures ever! Text only, but every detail of the plot is the same as the famous Spectrum version. FREE 285pps illustrated book with clues. Unique real-time quest: 80 locations: massive vocabulary: accepts multiple commands in plain English: 16 page manual. It IS as good as you've heard! NO STIX. **(Melbourne House) £14.95**

TRENCH *"Nothing short of manna from heaven" (PersCompNews)* The least exciting name we've heard for one of the most exciting games we've played. How about flying your Beeb X-Wing Fighter down the 3D Trench towards the Death Star-style target, dodging the tie-fighters as they attack? 9 skill levels: sensational graphics. STIX O.K. **(Virgin) £7.95**

PIMANIA *"This game can damage your brain." (PersComGames) An original and amusing game" (PersCompNews)* **AT PRESSTIME YOU CAN STILL WIN THE £6,000 GOLDEN SUNDIAL OF PI!** Simply by solving this wonderfully witty adventure. Brilliant use of music and graphics. NO STIX. **(Automata) £10.00**

3D BOMB ALLEY *"Very addictive game ... good value for money." (Beebug)* Beautifully executed 3D simulation of an air-sea battle. Just defend your ships against air attack. Some of the most complex graphics we've seen on the BBC. STIX O.K. **(Software Invasion) £7.95**

PARAS NEW graphic battle game: Not an adventure or arcade game. A gripping simulation of small-unit actions. Command 15 men: 10 possible actions for each man, each move: 10 skill levels: 2-part game, first secure your retreat and then destroy the bridge. Absorbing. NO STIX **(Lothlorien) £6.95**

747 FLIGHT SIMULATOR *"The best flight simulator around that runs on the Beeb ... a must for all budding pilots." (PersCompNews)* By Captain Roger Selby of British Airways. You're in charge of a 747 which you may land at either Heathrow or Gatwick. 11 control keys: clear instrument display: good runway view as you approach: 8-page on-screen flight briefing. Realistic crashes, but instructive flights too! STIX O.K. **(Dr Soft) £8.95**

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JANUARY CONTEST WINNER

The winner of our January contest was Mr R.J. Gallafent of London. He received his AMS 3 inch drives as the result of the following lyrical effort:

How can I tell thee
Can I count the ways
in which disc systems save
those wasted days?
Rotating data
ever will surprise
and give me time
to gaze more in thine eyes.
So be not harsh!
the cash I spent on time
to render me
more permanently thine.

HOW carefully do you read your Micro User? We're asking because Percival, our demented programmer, has managed to concoct the awful program you can see here.

PERCIVAL'S PROGRAM

```
10 FOR loc%=start%TO stop%
20 RX%(Z%+1)=(19-((Z%+1)*2))
30 X=68:Y=528:P0%=6:P1%=6
40 DATA 100,30,90,715,230,3
50 PRINT TAB(13,18-S%)CHR$ (234)
60 IF A$="N" THEN CALL&DBBE
70 PRINT #sf%,e%(1%,k%)
80 UNTIL INSTR("bBg6",A$) <>0
```

What he's done is to take lines, or parts of lines, from listings in this month's *Micro User* and put them in one renumbered program.

It's got us completely baffled, so we have decided to use it as the subject of this month's contest.

Can you help us sort the lines out? All we want you to do is to fill in the coupon below, giving each line its correct number and telling us the page of the magazine you found it on.

We'd also like to know the kind of program you would most like *Micro User* to list in a future issue – no more than 20 words, please.

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All in all, it's a winning combination of programs, so why not enter? But remember – we have to receive your coupon no later than April 30, 1984.

Your FREE entry form

Line Number	Actual Line Number	Page Number
10		
20		
30		
40		
50		
60		
70		
80		

The program I'd most like to see listed in *Micro User* is ______

Name ______ Address ______

______ Tel. No. ______

POST TO: Software Pack Contest, *Micro User*, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY

POLICE
e
ALARM

Sound

THE aim of this program is to create a store of interesting sounds that can be sampled and the parameters noted for use in one's own programs.

It is not meant to be an ENVELOPE designer, but depends on already having sounds worth saving. These can be taken from the Sounds Exciting pages of *Electron User*, or from games.

Running the program will display the menu:

LOAD FILE: This will prompt the user for the name of a file already saved.

INPUT NEW SOUNDS: Twenty-six sounds can be saved on one file and are labelled A to Z. The user will be prompted to press a letter.

On the right of the display he will be reminded of the first free letter. On first running this will of course be A.

Then he will be asked to supply a descriptive name for the sound, such as "Crash!". This can be up to 24 characters long.

Next he will be asked to input the parameters for the ENVELOPE and SOUND statements. The labels are the same as the ones used in the User Guide.

Finally, the user is asked if he is happy with the numbers input. If the answer is N then the initial values can be overwritten. Pressing Y will send the program back to the menu.

LISTEN TO SOUNDS: This displays the names of all the sounds entered, labelled from A to Z. Pressing any letter will cause that sound to be played, and the ENVELOPE and SOUND statements to be displayed at the bottom.

If you wish to stop the sound before its natural completion then press a key (the space bar is the most convenient). Another letter can now be pressed and another sound heard.

To return to the menu press Return.

SAVE SOUNDS: This will save the names and parameters of the sounds input on a file. The user is asked for a filename. After saving the program returns to the menu.

There are a few important points to note when using the program.

If a section of the program is entered by error, pressing Return by itself will always return the user to the menu.

This is also the way to return to the

Library

JOHN TISSANDIER'S filing system allows you to pick sounds for your programs off the shelf

menu from the LISTEN TO SOUNDS section.

It is important to fill up the available spaces (labelled A to Z) alphabetically. This is because the savefile procedure will check for the first empty element in the name array and only save up to that point.

Anything beyond a blank name will be ignored. This is so as not to waste time saving empty sections of the arrays on file.

The program is written in Mode 3, which gives 80 characters to a line. It was developed using a monitor.

If there is too much flickering when used with a TV set try *TV0,1 and remove the background effect by deleting line 200.

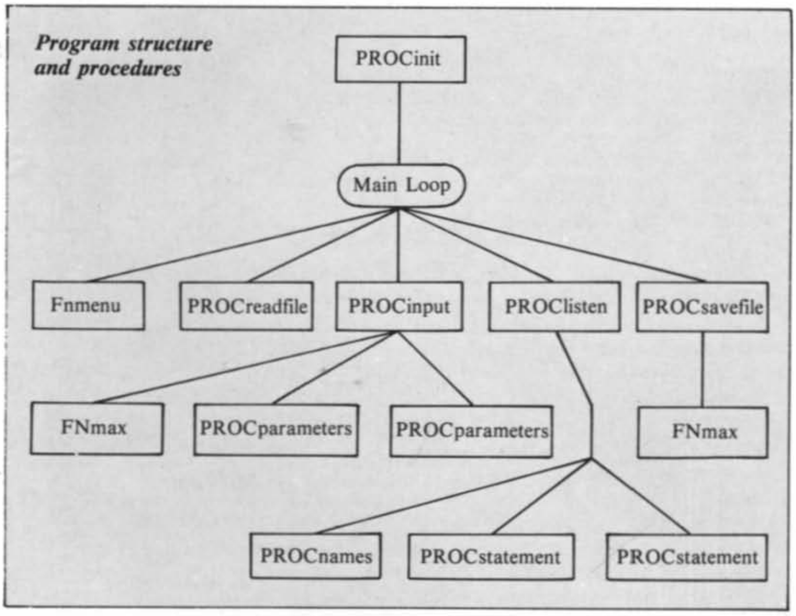
Although the program displays the letter label of the next available space, the user could accidently overwrite data.

Line 690 could be altered to include an "Are you sure?" function if it detects data already present in the element of the name array chosen by the user.

Each of the parameters of the ENVELOPE and SOUND statements has its own specific upper and lower limits.

Line 900 in PROCparameters merely performs a universal crude check of seeing that the number input is no greater than 255 and not less than –128.

A function could be inserted here to provide a more precise individual check on each parameter.



The procedures are self-explanatory. FNmax checks how many sounds have been input. PROCstatement prints out the ENVELOPE and SOUND statements for the sound being heard.

Arrays

name$(26)	Name of sound.
e%(13,26)	Envelope statement parameters.
s%(3,26)	Sound statement parameters.

Global variables

az%	A number from 0 to 25 (corresponding to a letter of the alphabet) which selects the sound to be input or heard.
e$	ENVELOPE
s$	SOUND

Formal parameters

s$	Pass on to PROCparameters whether envelope or sound statement.
y%	Pass on y-coordinate of TAB.
n%	Size of loop.
a$	"e" or "s".

Local parameters

o%	Menu option.
k%,1%	FOR ... NEXT loops.
para%	Input parameters for envelope and sound statements.
fname$	Filename.
rf%,sf%	File channels.
max%	Number of sounds input (this controls loop in PROCsavefile, etc.).
wait%	Delay.
name$	Input name of sound.
g$	GET$
X%	x-coordinate of TAB.
c%	Counter in REPEAT.. UNTIL loop in FNmax.

Special points

(refers to line number of program)

40	Lower display by one line to centre background effect.
180	Disable escape key.
190	Change field width to five characters.
200	Change logical colour 0 (black) to actual colour 4 (blue).
220-240	Set string array to maximum length and then return to null string.
460, 700, 1380	Pressing Return returns to menu.

→

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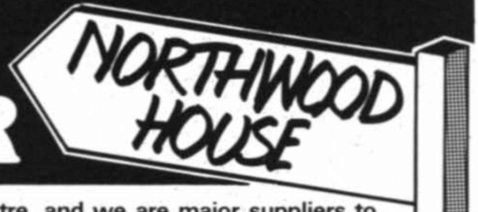

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From Page 65

670	Checks for next empty element in name array and prints its label.
1040, 1110	Turns flashing cursor off/on to improve display.
1090	This line delays program while sound is heard. The delay is proportional to the duration of the note, given by s%(3,az%). Using INKEY means that pressing a key before the end of the delay causes *FX 15,0 to flush the sound buffer and the sound stops.
1280	Using EVAL and passing on "e" and "s" allows the envelope and sound parameter arrays to be read by the same loop.
1610	Data statement for built-in sound heard when returning to menu from LISTEN TO SOUNDS option. This is stored in the 26th elements of the arrays and is read in at lines 250, 260 *(Note that Sound A starts at 0 and Z at 25.)*

Sound Library listing

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```
   10 REM SOUND LIBRARY
   20 REM J.M TISSANDIER JAN 1984
   30
   40 *TV 255
   50 MODE 3
   60 PROCinit
   70
   80 REPEAT
   90 o%=FNmenu
  100 IF o%=1
      THEN PROCreadfile
  110 IF o%=2
      THEN PROCinput
  120 IF o%=3
      THEN PROClisten
  130 IF o%=4
      THEN PROCsavefile
  140 UNTIL FALSE
  150
  160 DEF PROCinit
  170 LOCAL 1%,para%
  180 *FX 229,1
  190 @%=05
  200 VDU 19,0,4,0,0,0
  210 DIM name$(26),e%(13,26),s%(3
      ,26)
  220 FOR 1%=0 TO 26
  230 name$(1%)=STRING$(24,"*")
  240 name$(1%)=STRING$(24,"")
  250 IF 1%<4
      THEN READ para%
      : s%(1%,26)=para%
  260 IF 1%<14
      THEN READ para%
      : e%(1%,26)=para%
  270 NEXT
  280 e$="ENVELOPE "
      : s$="SOUND "
  290 ENDPROC
  300
  310 DEF FNmenu
  320 LOCAL o%
  330 CLS
  340 PRINT TAB(32,2) "SOUND LIBRARY"
  350 PRINT ''1,".  LOAD FILE"''2
      ,".  INPUT NEW SOUNDS"''3,".
        LISTEN TO SOUNDS"''4,".  SAVE
       SOUNDS"
  360 PRINT TAB(1,22) "NB. To return
       to menu press RETURN."
  370 PRINT TAB(1,14) "Choice : ";
  380 REPEAT
      : o%=GET -48
      : UNTIL o%<=4 AND o%>=1
  390 =o%
  400
  410 DEF PROCreadfile
  420 LOCAL fname$,rf%,max%,k%,1%
      ,wait%
  430 CLS
  440 PRINT TAB(34,2) "LOAD FILE"
  450 INPUT ''" Filename ? " fname$
  460 IF fname$=""
      THEN ENDPROC
  470 PRINT TAB(10,5) "="
  480 PRINT ''" Position cassette and
       'PLAY'.";
  490 rf%=OPENUP fname$
  500 INPUT #rf%,max%
  510 PRINT '''max%;" sounds now loadin
      g...";
  520 FOR k%=0 TO max%
  530 INPUT #rf%,name$(k%)
  540 FOR 1%=0 TO 13
  550 INPUT #rf%,e%(1%,k%)
  560 IF 1%<4
      THEN INPUT #rf%,s%(1%,k%)
  570 NEXT
      : NEXT
  580 CLOSE #rf%
  590 PRINT '''" Switch off recorder.";
  600 wait%=INKEY (400)
  610 ENDPROC
  620
  630 DEF PROCinput
  640 LOCAL name$,g$
  650 CLS
  660 PRINT TAB(33,2) "INPUT SOUND"
  670 IF FNmax=26
      THEN PRINT TAB(64,5) "Full!"
      ELSE PRINT TAB(45,5) "First free
       letter = ";CHR$ (FNmax+65)
  680 PRINT TAB(1,5) "Sound (A-Z) ?
       ";
  690 REPEAT
      : az%=GET -65
      : UNTIL az%<=25 AND az%>=0
      OR az%=-52
  700 IF az%=-52
      THEN ENDPROC
  710 PRINT TAB(13,5) "= ";CHR$ (az%+65)
  720 PRINT '" Name of sound ? ";
      STRING$(24,".")
  730 INPUT TAB(17,7) name$
  740 PRINT TAB(15,7) "="
  750 name$(az%)=LEFT$(name$,24)
  760 REPEAT
  770 PROCparameters(e$,10,13)
  780 PROCparameters(s$,16,3)
  790 PRINT ''" Are you happy with
       this (Y/N)? ";
  800 REPEAT
      : g$=GET$
      : UNTIL INSTR("YyNn",g$)
  810 UNTIL g$="Y" OR g$="y"
  820 ENDPROC
  830
  840 DEF PROCparameters(s$,y%,n%)
  850 LOCAL x%,para%
  860 x%=5
  870 PRINT TAB(1,y%) s$;"STATEMENT
       :"
  880 IF s$=e$
      THEN PRINT 'SPC (9);"N,   T,
```

Turn to Page 133

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B4

No – this game didn't fall off the back of a lorry

Delivery *Paean Systems*

HAVE you ever stopped to consider the everyday hazards and difficulties that the driver of a delivery van encounters? To be perfectly honest neither had I. At least, at the risk of sounding like part of some glittery TV commercial, that was until I came across Paean System's latest game.

Joking apart, I was at least initially attracted by the comparitively obscure nature of the game.

The screen is divided into sections comprising a map, a compass, a road junction layout and fuel and distance indicators.

Your job, as a newly-appointed driver, is to deliver various goods to different locations, using a road network constructed by the computer.

You are assisted on your travels by a display of your position and the possible directions in which you may continue as well as the status of the roads. There are one-way streets, bad roads which cause accidents and even speed restrictions.

Being allowed an initial commission bonus of £1,000, you can increase this figure by successful delivery of goods. It may also be decreased, however, by fines, endorsements and bad deliveries.

A score of more than £2,000 could win you a holiday, but return with a score of less than £10 and you join the ranks of the unemployed once more.

The game is not exactly an action-packed thriller. It does, however, have a few pleasing touches. You are personally selected for the job in hand and are accompanied in your errors to the tune of rather embarrassing sirens as well as unconstructive advice from your co-driver.

I found myself on more than one occasion tip-toeing away from the accusing alarms, denying all knowledge of a game they called Delivery.

For those of you, like me, who welcome any game that does not involve spaceships, man-to-man combat or rescuing the damsel in distress, Delivery provides a reasonably entertaining and original alternative.

Karen Torevell

DELIVERY
PAEAN systems

Zapping aliens is only the tip of the iceberg

Sea Lord *Bug-Byte Software*

APART from a freeze button and the starter, there are only three controls on this program – rotate left, rotate right and fire – as you drive a mini-sub through an unusual sea covered in places by cuboid icebergs.

The sub has a constant forward motion except at the screen edges, the control being to change direction by 45 degrees on each key-press. Very tricky to do, but a fascinating movement once you get the hang of it.

The action takes place in a midground fashion under the icebergs but over the background, so it is often obscured and you have to steer by guesswork.

You are attacked by – as far as I've got – four different types of enemy which are announced in a sententious manner before each screen, first one at a time, and then in various combinations.

A program like this can be very annoying, because just when you think you've got the feel of the control you make a mistake – and don't get on to the next screen.

In this annoyance lies its charm. It is simple in concept, but very well implemented.

The compulsion to play it just once more before going to bed has caused quite a lot of marital upset.

I must go now and have one last game before I send the tape back to *The Micro User*.

Ian Gustard

FULL MARKS!

Marklist *Optima Software*

THIS is a thoroughly worthwhile piece of software for school teachers with a BBC Micro. It sorts exam marks for any class of up to 40 children in a year group.

The maximum mark can be set to any level and automatic range checking is done.

The final lists can be printed alphabetically by year or form as well as numerically. Simple bar charts are produced of results and the degree of scatter of results is calculated and a "balanced" mark presented.

It is possible to save data to tape and retrieve it again. This obviously takes some time and I have found the program most useful for simply processing large

→

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lists of marks without bothering to save the data.

It will be more use in a secondary and middle school, than in junior and infants schools.

The program is menu driven, and is easy to use. I have not succeeded in crashing it and would consider it robust enough for those of us who lack confidence when confronted by the micro.

There are some inconveniences. It is impossible to score zero on a test. Well, very few youngsters ever do, but I wanted to use a zero to show that someone was absent.

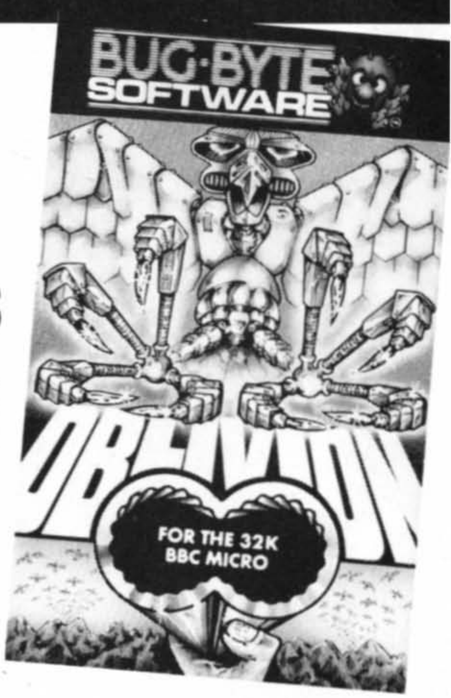
It would have been nice to add a few simple codes to show sickness or an estimated mark etc., otherwise one is left with an incomplete mark list.

This is a useful piece of simple software, and it will save keyboard hacks all over the country several hours programming their own mark list software.

Ian Murray

Space age version of dodgem cars

Oblivion *Bug-Byte Software*



NEVER having loaded a program from Bug-Byte before, the multiple parts initially made me think I'd failed to load it. Then I realised that what at first glance seemed to be loading errors was a number of short parts, each loading the next.

When the program started my first impression was "Ho hum, another space invaders", but then the differences became apparent.

There is a choice of one or two players, and then the game begins. The invaders drift slowly down the screen dropping bombs while you try to dodge them and shoot back.

The controls are left, right, up and fire, so it is easy to concentrate on the screen without having to search for the correct button.

When the invaders get closer they turn and follow your ship, attempting to collide with it with the inevitable destruction.

As your score rises other spatial manifestations appear, and it becomes even more difficult because it speeds up.

The unusual technique suggested on the cassette label for driving the invaders into the screen edge seems to work.

Which is just as well, as this gives you a chance to make up for the one major criticism I would make, that is the "re-loading" time between shots was too long for my liking.

Many times the invaders are directly in line of fire, but it refuses to fire in time. However if the phone rings at a bad moment it is possible to freeze the action until you return.

The graphics are good and the action smooth. One touch of humour I liked was if you wait too long to start the next game it plays itself with a comment of "Boring Earthling".

It pays to start it quickly after that, as its score is recorded as the high score.

It may be my imagination, but I think the firing button works faster on the demonstration game than it does normally. My testing panel of arcade kids voted it "OK, but slow".

Ian Gustard

QUICK RUNS

A first look at some of the latest releases

Sliding Block Puzzle: *Similar to jigsaw puzzle, this game differs in that one of the puzzle sections is missing. The idea is to reconstruct the jumbled picture by sliding the blocks around the screen.* (ega beva)

★ ★ ★

Jigsaw Puzzle: *A game to test your memory skills whatever your age. The object is to reconstruct a picture which has been split into sections and shuffled about. There are several levels of difficulty.* (ega beva)

★ ★ ★

First Steps with Mr Men: *Educational games for four to eight year olds. You must guide Mr Greedy around increasingly difficult mazes, collecting ice cream, identify hats described by Mr Silly, match Mr Forgetful's pairs of clothing and match Mr Forgetful's pairs of letters.* (Mirrorsoft)

★ ★ ★

Vortex: *Pilot your five star fighter through deep space, using laser torpedoes to ward off attacking aliens as they streak towards you from the depths of a Black Hole. As the attack weakens you are faced with high speed asteriods which must be avoided. Then you accelerate towards the Black Hole to face yet more aliens and asteroids.* (Software Invasion)

★ ★ ★

Star Trader: *A galactic trading game in which you pilot a starship on a mission to buy a Super Computer. You must mine for rare minerals on strange planets and trade with other races for food, air and fuel.* (First Byte Computers)

★ ★ ★

Dambusters: *Fly your bomber over rugged terrain in an attempt to score a direct hit on the Mohnesee Dam with your bouncing bombs. Avoiding the enemy planes and flack from hidden gun batteries, you must establish your height by matching converging searchlights on the water surface.* (Alligata)

Marooned on the moon

Escape from Moonbase Alpha *Program Power*

AS a well-known android once said, "Life? Don't talk to me about life". In this program it's a commodity that doesn't last very long.

On first inspection, the game seems simple enough. You control Joey, an astronaut marooned inside the Moonbase whose only means of escape is to find the Doctor.

He will want payment for transporting you to earth in his police box, but scattered around the base are bags of gold which you can pick up as you go along.

So off you go from room to room, moving left, right, up, down, towards or away from the screen (yes, 3D graphics, folks). But then the complications start.

The Moonbase also contains the nastiest set of inhabitants since the Borgias. There's Deadly Doris, a TV set on legs, who has the unfortunate habit of turning people into frogs.

Then there's the Metal Mauler, a vicious Dalek clone, and the Green Grappler, a creature with all the pacifist instincts of a tanked-up Chelsea fan.

And as if they weren't enough, there's good old Marvin, a robot with a line in conversation so riveting that you're literally bored to death in seconds.

To help you survive, you have a small supply of Hulk pills, which temporarily turn you into a rampaging green monster capable of smashing through walls. However, these don't last long, and they leave you even weaker than before.

As I said, survival isn't easy.

The game is so fast it is fiendishly difficult, but the excellent graphics make it great fun to play, and the feeling that next time I'm sure I can crack it kept me reaching for the replay button.

James Bibby

TINY PROBLEM

Shrinking Professor *A & F*

I MUST admit I've always had a habit of rooting for the underdog, so it's nice to come across a game that takes the side of the little man.

And in A & F's Shrinking Professor, a text-only adventure game, that is exactly what you are, a very little man.

Working away in the lab one night, a potion slips from your grasp, and choking green fumes envelop you. Waking some time later, you find that you have shrunk to an inch in height, and have slipped through a crack in the floorboards.

You know there are some crystals on top of the lab table which will restore you to your former height, but getting there could be a pretty tall order.

And so begins a tricky quest. There's nothing so obvious as a magic wand or a horde of gold in this one. I mean, what do you do with a darning needle the size of a javelin, or an enormous fingernail?

Dragons and trolls may be a piece of cake for an experienced adventurer, but how on earth do you get past a hungry frog or a very cross vole?

This for me is what changes Shrinking Professor from an average adventure into quite a good one. The locations and objects are novel, and there are sound effects to grab the attention.

The game doesn't reach the heights of, say, Level 9 or Acornsoft – it's quite a bit smaller for starters – but it is fun, and difficult enough to cause even an expert a few problems.

I haven't even managed to cross the main road yet. Every time I try, along comes a car and splat! Now I know how a hedgehog feels. **James Bibby**

Arcade action

Missile Base *Acornsoft*

THIS is a superb adaptation of the arcade game which will have you glued to your TV screen long into the night, desperately trying to defend your cities against hostile missiles.

The only way to stop them is to skilfully fire your rockets to explode into fireballs in their paths. But don't be too trigger happy because you only have three anti-missile bases with nine rockets in each one.

Once you think you're coping with the missiles the fun starts, because then come the ones with multiple war heads which disperse at a fixed height if you don't get them, and throw out a burst of yet more missiles.

Also there are some very mean intelligent missiles which can dodge your fireballs and head for your cities and bases. And if all that sounds daunting, then wait until you get the satellites and planes as well!

If you really want to get the most from this game you have to play it with joysticks. In fact you'd probably need at least three hands and a lot of patience to even attempt it with the keyboard controls.

This is definitely one of the best games for the BBC Micro available.

Jane Jackson

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***OPT3,n**	**Alters the number of tracks per disc to n**
***OPT5,n**	**Sets the start of the DFS buffer (see OPT7)**
***OPT6,n**	**Provides control over which part of the file spec. will be displayed ie. only display directory and program length, or just display drive and load address.**
***OPT7,n**	**Sets the length of the DFS buffer**
***OPT8,n**	**Double steps the disc drive to allow the reading of 40 track discs on 80 track drives**
***SYS**	**Selects either Acorn mode or Extended mode** **Commands now include *Access**

There is a built-in formatter which will format in either forty or eighty tracks in both modes of operation. This formatter also allows for user definable parameters to be included for the development of software protection.

With this disc filing system a user definable buffer can be used while compacting the disc. This will enable disc compacting to be carried out without overwriting any programme in memory. Alternatively a new disc may be formatted without any resident programme being overwritten.

This DFS also allows for the use of wildcard characters, using either the # symbol for a single wildcard and the * character for multiple wild characters. (e.g. CHAIN "P*" could be used to chain a program called PRINTER as long as there are no other files whose names begin with P).

This DFS is totally compatible with Econet etc., and is complete with a utilities disc and comprehensive manual. The utilities disc contains many useful programmes including printer screen dumps in all modes, including High Res. (Epson & NEC 8023). It also has a nibble editor to scan discs, read data, edit them, and then write back to the disc. Plus a utility to assist in the transfer of cassette files to disc.

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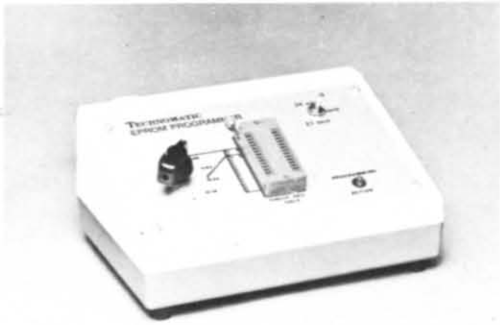

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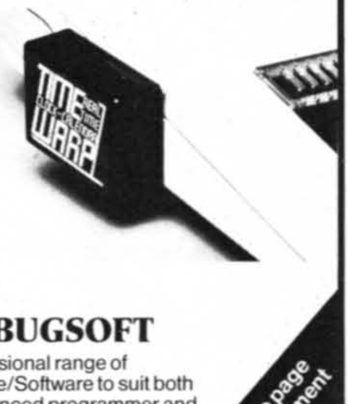

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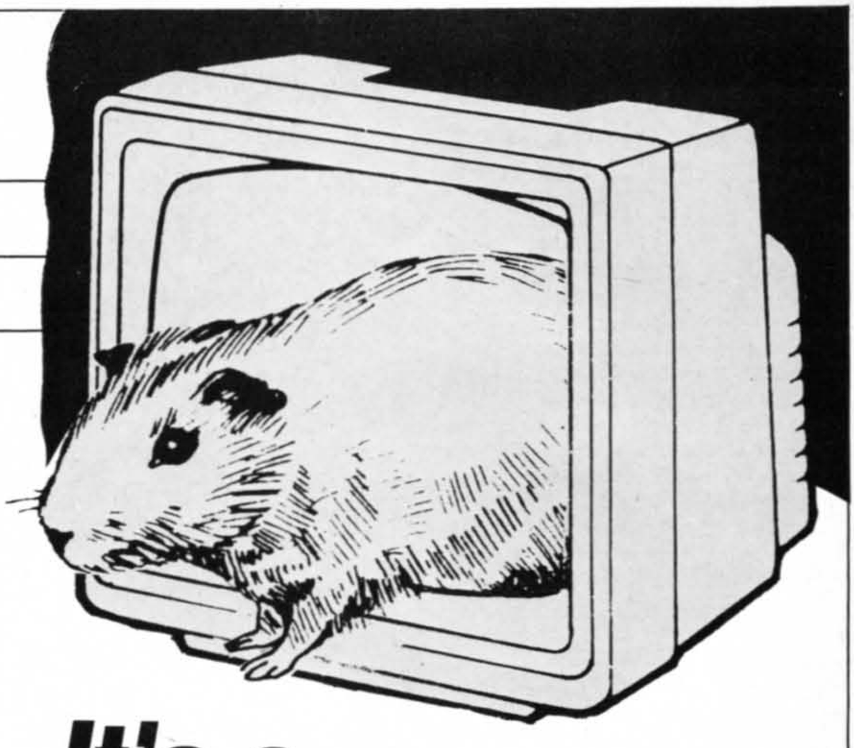
Introducing the BBC II Micro



It's a hamster ahead of the rest!

COMPUTERS are becoming more user-friendly. At one time, in the prehistory of microcomputing, the difficulties of using a micro were so great that only trained specialists and 14-year-old schoolboys could cope.

The machine had to be given instructions in a complex and difficult language such as Ada, Pascal, or, more commonly, Basic, which often took as long as a day to learn and a month to become reasonably familiar with.

Not only that, but the executive user had to lower himself to the status of one who used a typewriter keyboard.

All this has changed with the newest generation of micros, which is made up of machines whose sole function is to support packages, and not to provide a vehicle for programmers to mess about.

There is no business that cannot be restructured to fit in with the workings of a standard accounting or stock control package, and designers see the computer of the future as providing the information and control packages around which a business can be redesigned.

Once such packages are in existence there will be no more need for anyone to write another program or learn a programming language.

Computer experts will be men who specialise in the selection and use of these packages. Even program generators such as "The Last One" and "Pull The Other One" will be rendered obsolete.

Only a tiny number of people will be able to write programs, and these will produce and maintain all the smoothly running and flashy packages that will appear for use on the micros.

The new generation of micros is called the last generation because no further generations will be possible. It will only be possible to improve on the machines inside the generation.

So far two manufacturers have released machines onto the market which aspire to the last generation – the ACT Sirius and the Apple Lisa. Recent leaks from Acorn, however, show that British genius is about to release onto the market the only machine truly worthy of the last generation. Tentatively named the BBC 2 Micro it is a true last generation product. Once it has been released no other manufacturer will be able to compete without the years of research needed to catch up.

In last generation micros the architecture of the machine is not particularly significant when compared to the range of software that will be supported as soon as it is written.

Even the colour of the casing is more important than the fact that the BBC 2 micro is based on the new 32 bit Z90 processor, which is a new design expected to repeat the success of the old Z80 processor, on a larger scale.

The 32 bit register on the Z90 is the status register, which allows a new concept in random condition codes. The accumulator is a 16 bit register, and the X and Y registers and the data bus have 8 bits to allow for the use of cheap 8 bit support chips.

By RON H.J.POETH and SAM MacMAB

The instruction set is completely compatible with both Z80 and 6502 processors, and both instruction sets form subsets of the Z90 instruction set. When using these instructions the top 8 bits of the accumulator and all but 7 bits of the status register are ignored.

The remaining instructions on the Z90 are mainly stochastic or random instructions such as XRI (Execute Random Instruction) and SRS (Store in Random place on the Stack). The address bus has 32 bits, allowing a Gigabyte to be addressed, but as the address register has 16 bits, this must be addressed in pages of 64k.

The most striking feature of the BBC 2 micro is its complete lack of keyboard. Input is performed using either the 32 user defined function keys or the

→

From Page 75

hamster. The hamster is a small box on a rolling ball which, when moved over the desk top, causes a corresponding movement in a cursor on the screen.

Apple have made a near miss at the hamster idea with the object they call a mouse on the Lisa microcomputer, but the mouse completely lacks the storage facilities of a hamster. A keyboard is available as an optional extra, when it plugs into the RS632 port.

Another obvious point about the BBC 2 is that it is a completely soft machine. Indeed, the casing is so heavily padded that it should be able to withstand all possible damage, whether from moving to a new office or from the blows of frustrated users who have just pressed the wrong key and accidentally deleted 60,000 records from their master stock file.

The screen is mounted on a device like the framework of a anglepoise lamp, thus allowing a virtually unlimited range of working positions, which should see an end to stiff shoulders, "VDU strain", and "computer neck" caused by hunching over to view. The manual recommends that, for maximum comfort, the BBC 2 micro should be operated while lying on one's back on the floor.

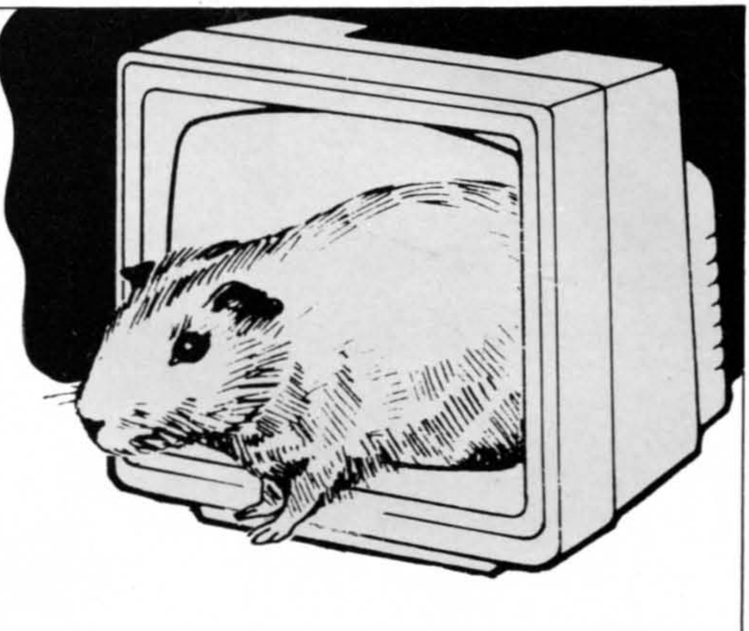
The BBC 2 micro possesses a bewildering variety of ports and interfaces. Apart from the usual A to D converter there is a D to A, a D to D and an A to A. Printers can be run from Centronics, RS632 or IEEEE sockets (the IEEEE bus is an extension of IEEE).

The micro also supports a tunnel, which is an enlarged version of the tube. No manuals are available for this because it does not work.

The 1 mHz bus has been upgraded and made more comfortable, and has thus become a coach. The most spectacular port is, however, the RS632. This is fully RS232 compatible, but has much extended facilities. For example, the transfer rate of the RS632 can be adjusted from 2 baud to 32 megabaud (not guaranteed) and the range of operation is 50km without a booster.

The RS632 is also British Telecom approved, and can be linked directly into the telephone system without a modem. The BBC 2 micro should therefore be able to perform all the tasks of a telephone exchange, given the correct software.

The only reason for the existence of micros is to run personal business software. In the old days this meant Visicalc, but the BBC 2 micro goes far beyond this (or anything else) in offering packages for every conceivable zone of business life. These include the following:



Visi-Onary: This is a forecasting package which not only guarantees its forecasts to be 100 per cent accurate, but has a hindsight function (called Visi-Ssitude) which explains afterwards why they were wrong.

Visi-Bull: This is a general bureaucracy package. It designs forms, fills them in in triplicate and can be used to generate hundreds of pages of meaningless trivial and restrictive regulations using its special word-processing feature Bumf-Star. VisiBull is guaranteed to be between 29 and 107 times as mindlessly awkward as a professionally trained human bureaucrat.

Visi-Tation: This mailing list program was originally designed for use in churches, and is one of the few mailing list packages to distinguish between an epistle and an encyclical.

In-Visi-Ble: There are many office diary programs around, but this one has the special feature of noting appointments made by unwelcome or awkward visitors and producing an audible warning in time to arrange to be out when they call.

Other packages include stock control (Pro-Visi-On), data base (Subdi-Visi-On), an education package (Re-Visi-On) and a program for keeping track of company admin called Long Di-Visi-On (5 mbyte and above versions only).

The package of special note is Super-Visi-Or, which performs exactly in the same way as a secretary. It will file all your work where it can't be found, delay all your typing for inordinate lengths of time, and when there is no longer enough time to correct a memo will release it with scores of embarrasing typing blunders. Super-Visi-Or sulks if given more than a minimal work load, and bursts into tears in a most realistic fashion if told off.

The other software feature is the software on/off switch, Visi-On. This uses three permanently assigned user defined keys marked O, N, and F. Using these to type ON switches the machine on, and typing OFF switches it off again. A small battery is used if ON is entered when the machine is not plugged in. In this case the message "NO POWER SUPPLY – PLEASE PLUG IN" appears on the screen with a little picture of a 13 amp plug.

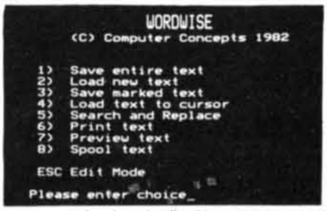
The CP/M operating system is used for the BBC 2 micro. At present this is only available in a preliminary version, called, for traditional reasons, 0.1 EPROM. Unfortunately this contains no bugs, and is thus incompatible with any other CP/M system. A team of programmers is working night and day implementing all the necessary bugs, and when this is complete the result will be put into ROM and called series 1.

CONCLUSION

The BBC 2 microcomputer is a last generation machine worthy of the name. Indeed, if this machine becomes standard for the future it is doubtful whether any more computers will ever be bought.

ROMS

SOFTWARE FOR THE BBC MICRO



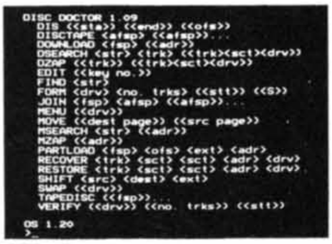
```
                WORDWISE
       (C) Computer Concepts 1982

   1)  Save entire text
   2)  Load new text
   3)  Save marked text
   4)  Load text to cursor
   5)  Search and Replace
   6)  Print text
   7)  Preview text
   8)  Spool text

   ESC Edit Mode

  Please enter choice_
```

WORDWISE

This ROM based word processor is simple to fit and simple to operate. Its greatest strength lies in its ease of use, yet it is a fully fledged text processing system, with all the features you would expect to find in many more expensive programs.

Once entered the user has total control over the text. Any section may be marked, this may be a word, sentence or any larger piece of text. The marked section may then be instantly deleted, moved or copied to any other point in the document. The more complex operations are menu driven so that the user is always prompted when necessary. When printing a document the user may specify the line length, line spacing, page length etc. WORDWISE even handles automatic page numbering, centering of text, justification and many more powerful features.

This word processor has become the best selling program for the BBC machine. In the year since its launch it has outsold all other available ROM, cassette or disc based word processors and continues to outsell them. **£46 incl. VAT and p&p.**



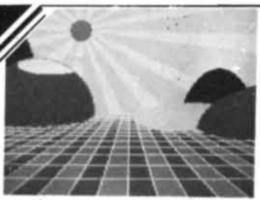
```
DISC DOCTOR 1.09
  DIS <<sta>> <<end>> <<ofs>>
  DISCTAPE <afsp> <<afsp>>...
  DOWNLOAD <fsp> <<adr>>
  DSEARCH <str> <trk> <<trk><sct><drv>>
  DZAP <<trk>> <<trk><sct><drv>>
  EDIT <<key no.>>
  FIND <str>
  FORM <drv> <no. trks> <<stt>> <<S>>
  JOIN <fsp> <afsp> <<afsp>>...
  MENU <<drv>>
  MOVE <<dest page>> <<src page>>
  MSEARCH <str> <<adr>>
  MZAP <<adr>>
  PARTLOAD <fsp> <ofs> <ext> <adr>
  RECOVER <trk> <sct> <sct> <adr> <drv>
  RESTORE <trk> <sct> <sct> <adr> <drv>
  SHIFT <src> <dest> <ext>
  SWAP <<drv>>
  TAPEDISC <<fsp>>...
  VERIFY <<drv>> <<no. trks>> <<stt>>

OS 1.20
>_
```

DISC DOCTOR

Following on from WORDWISE this utility ROM is the ideal way to get the most out of your computer system. This ROM adds 20 new commands to the Machine Operating System. Most of these are concerned with DISC operation although some of the commands are totally general purpose. Disc Doctor allows up to 60 files per side of a disc and includes its own disc formatting and verifying commands. Three search commands will find any string in memory or on disc, or will list all the line numbers in a BASIC program that contain the string. Many other features include disassemblers, disc/memory editors, function key listing etc. Works with all versions of the Acorn DFS, and other Acorn compatible DFS's. **£33.35 incl. VAT and p&p.**

Because the Printmaster and Disc Doctor are in ROM they are always available, and usually take no user memory when operating. All the commands can be used from within BASIC programs and the ROMs includes a help menu listing the syntax of all commands.

new release



Printmaster

Joining our already extensive range comes PRINTMASTER a sophisticated printer handling utility ROM. PRINTMASTER will be released in several versions catering for each of the most popular printers on the market. This first PRINTMASTER ROM supports a range of EPSON printers: MX80, RX80, FX80, and other component printers.
All commands in the ROM must be preceded by an asterisk and can be used like all normal operating system commands from within BASIC programs etc. It is also possible to use them from WORDWISE and other language ROMs.

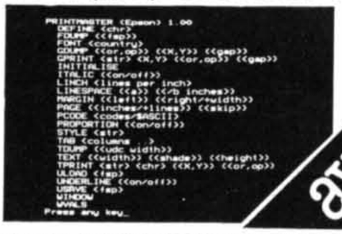
PRINTMASTER supports three types of screen dumps. The most flexible (★GDUMP) allows any graphics on the screen to be dumped onto the printer. This will operate in any mode, the colours being displayed as shades. Any part of the screen may be printed at any position on the paper in any one of four orientations. It is also possible to magnify the screen dump by any factor x2, x3, x4 etc.

A special feature allows true Mode 7 screen dumps with TELETEXT text and graphics, colours (as shades), double height etc.

★TDUMP allows any text mode to be dumped and ★FDUMP will automatically print the contents of a file on disc to the printer WHILE the BBC machine is doing other things, running other programs etc.

★WINDOW allows the user to interactively define a graphics window, this controls the part of the screen printed in ★GDUMP
★WINDOW is a very much easier method of defining graphics windows than the normal VDU statement.

The above list is only a fraction of the commands in the PRINTMASTER ROM. Others include ★TAB, ★UNDERLINE, ★ITALIC, ★MARGIN etc. etc. which provide total control over the printer in the easiest possible manner. Order as PRINTMASTER (Epson). **£33.35 incl. VAT and p&p.**



```
PRINTMASTER (Epson) 1.00
  DEFINE <chr>
  FDUMP <<fsp>>
  FONT <country>
  GDUMP <<or,op>> <<X,Y>> <<gap>>
  GPRINT <str> <X,Y> <<or,op>> <<gap>>
  INITIALISE
  ITALIC <<on/off>>
  LINCH <lines per inch>
  LINESPACE <<a>> <</b inches>>
  MARGIN <<left>> <<right/+width>>
  PAGE <<inches/+lines>> <<skip>>
  PCODE <codes/$ASCII>
  PROPORTION <<on/off>>
  STYLE <str>
  TAB <columns ...>
  TDUMP <<udc width>>
  TEXT <<width>> <<shade>> <<height>>
  TPRINT <str> <chr> <<X,Y>> <<or,op>>
  ULOAD <fsp>
  UNDERLINE <<on/off>>
  USAVE <fsp>
  WINDOW
  UVALS
Press any key_
```

available now

Computer Concepts specialise in writing quality software for the BBC machine. We have been involved with the BBC Micro since its inception and write for no other machine. We are not dealers, nor are we involved in selling anything other than software.

All the above products and further details are available either directly from us or from all good BBC dealers.

COMPUTER CONCEPTS

Access

16 Wayside, Chipperfield, Hertfordshire. WD4 9JJ Telephone: Kings Langley (09277) 69727

VISA

¡Imagine speaking Spanish!

What is described as "a radical new system for learning foreign languages by computer" – called Linkword – has been launched by Acornsoft. Each course teaches a 400 word vocabulary and "enough basic grammar to enable the user to understand and be understood in a foreign country." Here MAX PARROTT tries out the first in the series – Spanish. Other Linkword languages are French, German and Italian.

THAT'S how I learnt French and German at school. Needless to say I cannot speak a word of either language today.

Just after I left school the great vogue for language laboratories started. These, while not discredited, play a smaller part in language teaching than they once did.

The traditional way of such teaching is to learn grammatical technique by exercise, and vocabulary by rote learning, listening and repetition.

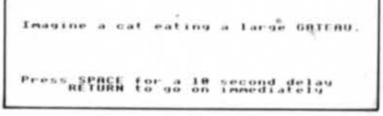
Linkword applies psychology to language teaching in an attempt to aid memory and word recall. A vocabulary is built up by associating a foreign word with a mental image, not necessarily of an object. Mental tableaux are also created.

By using these techniques it is claimed that Linkwords can cut learning time for basic vocabulary and grammar by up to 70 per cent.

My favourite image from the Spanish set is for *ratón* (mouse) – "Imagine a RAT ON a mouse, squashing it flat".

The set of 10 Spanish programs proceeds by presenting on the screen an English word, its Spanish equivalent, an indication of the pronunciation and a sentence (in English).

Thus a screen (in fact the first of the set) may look like:



```
                 The Spanish for

                   CAT is GATO
                     [GATO]

Imagine a cat eating a large GATEAU.


Press SPACE for a 10 second delay
    RETURN to go on immediately
```

The instructions at the beginning of the first program tell you to imagine this picture in your mind's eye as vividly as possible.

After reading the image you think about it for about 10 seconds before pressing Return to move on to the next word. If you do not spend enough time thinking about the image it will not stick in your memory as well as it should.

Hence the space bar option given at the end of the screen by which you can ensure 10 seconds' worth of time.

There is nothing new in associating images with words.

My Latin teacher always questioned one's lack of knowledge of a particular word by insisting that careful thought be given to the position in the text book where it was first encountered. On a left or a right facing page, at the top or the bottom of the page, etc.

Where Linkword differs is that the imagery is much more vivid.

The screens are displayed as white words on a black-ruled blue screen [MODE6:VDU19,0,4,0,0,0] which I found too bright to look at while trying to form my mental images, so I looked down at my lap.

This helped, but some of the suggested images I could not accept. The Spanish for duck is *pato* and to remember it I was supposed to imagine *patting* a duck on the head. All I could think of was duck paté!

Still, any image will do – at least I imagine it will – so the technique should work.

However there are problems with it.

The image given for *cabra* (a goat), is that of a *cobra* attacking a goat. This made me think that the Spanish was cabro (the reason being that the O of cobra I assumed had to be in the word but I knew it wasn't cobra so it had to be cabro).

After 10 words or so have been presented (these generally relate to each other – animals, motoring words or leisure activities, etc.) you are asked for the translation of the words in straight reverse order.

First having been given the Spanish word, you supply the English. Second, having been given the English, you supply the Spanish.

'Linkword can cut learning time by 70%'

Further on into the set, when armed with some verbs and prepositions, sentences and short phrases are also given for translation.

No attempt at marking is made. On pressing Return the correct translation is given and the next question becomes available.

Spanish uses an accent to mark stressed syllables of words which do not conform to the usual rules of stress. These accents, eñe, and those punctuation marks peculiar to Spanish (the upside down question and quotation marks) are all drawn on the screen. Unfortunately they cannot be typed at the keyboard.

After the translations comes a short text on some aspect of simple grammar.

The first concerns masculine and feminine words and the word endings o and a.

The last of the set mentions how to form adverbs by adding *-mente* to the end of adjectives in the feminine form. In between, adjectives, simple verbs, the time, prepositions, and the use of negatives are all lightly covered.

Each of the 10 programs of the Spanish set then continues with more words and grammar. When the keyboard work is finished a supplied audio tape should be played. This gives the pronunciation of each new word encountered.

My copy tended to vary in volume and there was a slight echo on it, but each word was very clearly pronounced.

The teaching concept does not aim for complete grammatical accuracy. For example no mention is made of the Spanish treatment of a person when the object of a verb nor of the Spanish dislike for referring to one's person with personal adjectives.

The object is clearly to enable one to remember and speak Spanish words quickly without the worries of grammar getting in the way – after all, this is how little Spaniards learn the language.

But little Spaniards do learn the usage of words as they grow up, whereas here they are not always given.

For example the word *soy* is given for I am and *frio* for cold, which will tempt the user into saying *soy frio* when he should say *tengo frio* (I am cold).

If you are thinking of using Linkword in a formal teaching environment then, as in all such cases, a disc based system is really needed because the cassette loading times are quite long as each program has about &40 sectors.

Acornsoft appear to have thought so too because each program (after the initial one) sets PAGE to &1900.

I had no trouble transferring the pre-production, review copy of the cassette to disc. I sincerely hope that the production model is similarly unprotected or that the system is also sold on disc.

I have a couple of small grumbles about the programming of Linkword. Between each new word a clear screen with the phrase 'The next word is: . . .' appears. The actual word screen then says 'The Spanish for . . .'. This doesn't read as proper English.

The other grumble, I suspect, will gladden all BBC programmers – it did me. The upside down question mark, created as a user defined character, has one bit misplaced so that it is not quite perfect.

The big question is ¿does Linkword work?

In order to answer this I persuaded several people to spend time in front of the machine. People with no prior knowledge of Spanish were definitely able to learn Spanish words and simple sentences quickly and accurately.

The imagery didn't always work. One person faced with *cajón* could remember it involved a *car horn* but not where. (It should have been "imagine a car horn sounds every time you open your drawer".)

Heavy reliance is placed on imagining bullfighters in weird and wonderful situations – imagine a bullfighter with a coat of many colours (for color) – imagine a bullfighter in sandals (for sandalia) – imagine thinking "NO! NO! Mr Bullfighter" (for no) – and so on.

There also seems to me to be too much reliance on the relation between the imagery and the spelling of the word, rather than the pronunciation.

I'm thinking of "being *cosy in* a kitchen" for *cocina, "a parade"* for *pared,* "playing *polo* with a chicken instead of with a ball" for *pollo.*

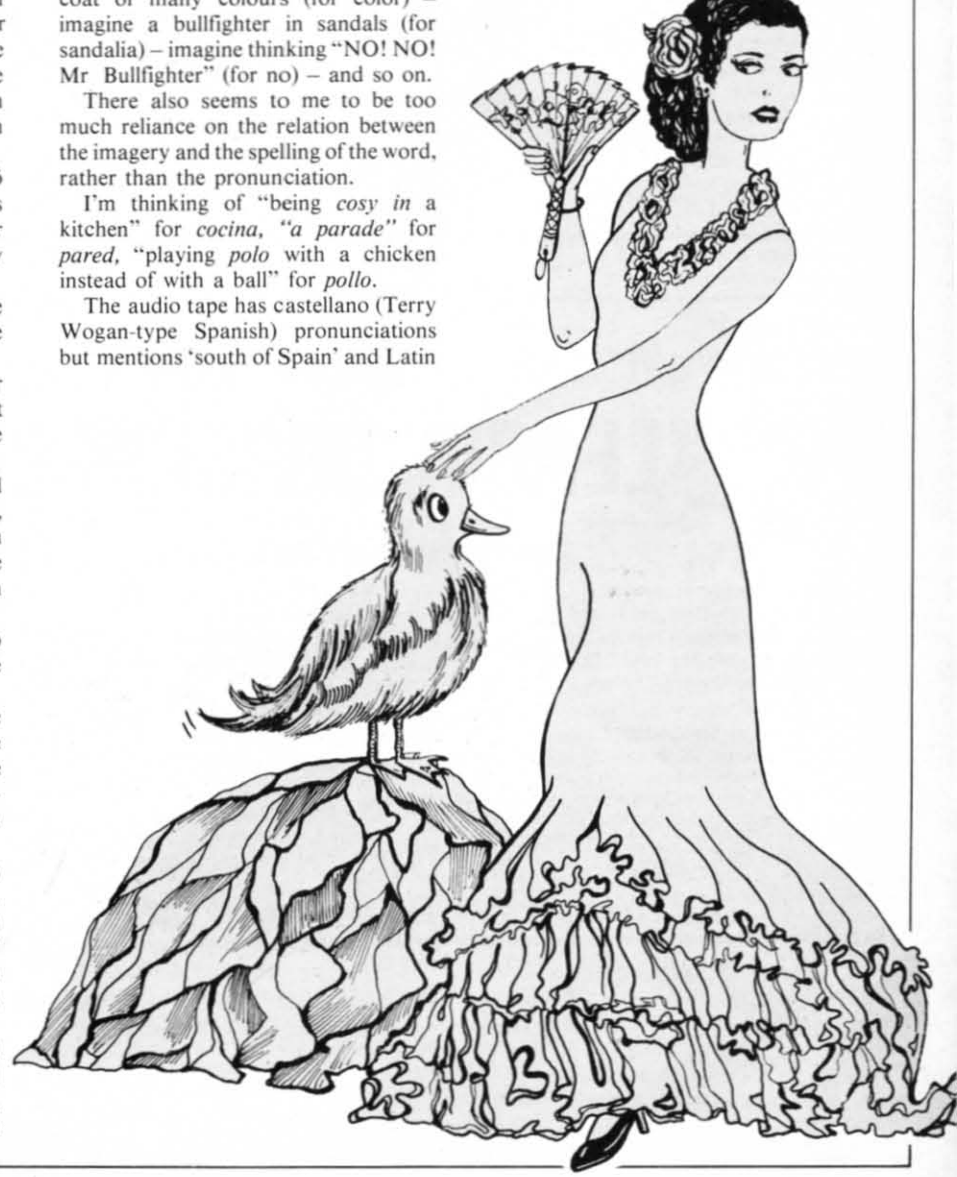
The audio tape has castellano (Terry Wogan-type Spanish) pronunciations but mentions 'south of Spain' and Latin American pronunciation at the end after all programs have been covered.

I believe Linkword to be a very good attempt at a new technique of computer learning.

Each program cassette, audio cassette and instruction booklet costs £14.95, and if Acornsoft's claim that users become highly motivated, recalling as much as 98 per cent of 400 words after a three day course of 12 hours total is anywhere near true then it represents good value.

It would be interesting to know if the use of media other than the computer, such as slides or cartoons, but with the same psychology works as well.

¡Hasta la vista!



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B) COLOUR BLOCKS bring sizes and colours into perspective.
C) MERRY MUSIC turns the keyboard into a musical keyboard.
D) FUNNY FACES presents a line up, which one is the suspect?
E) FRED THE FROG needs co-ordinated help to get across the pond.

EARLY YEARS 2
A) THE POND seems very active today.
B) SPEED is required to keep the cake on the conveyor belt.
C) DIRECTIONS seem to be needed by everyone in Orion village.
D) ORDER the blocks.
E) SID THE SPIDER needs some help to get out of the maze.

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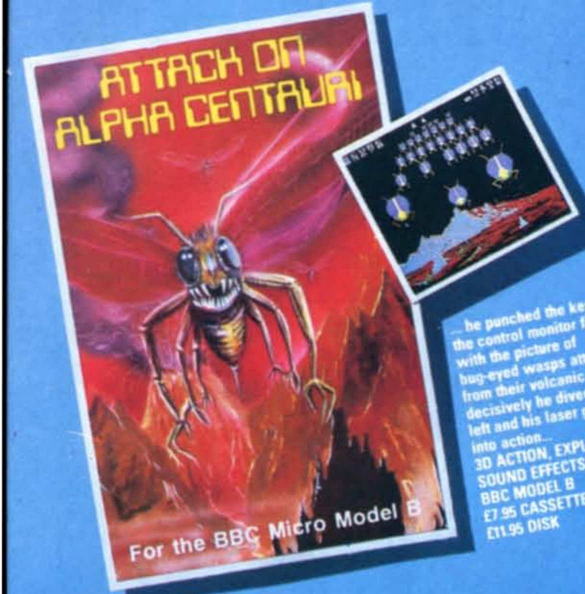

...he punched the key, and the control monitor filled with the picture of bug-eyed wasps attacking from their volcanic nest; decisively he dived to the left and his laser gun burst into action...
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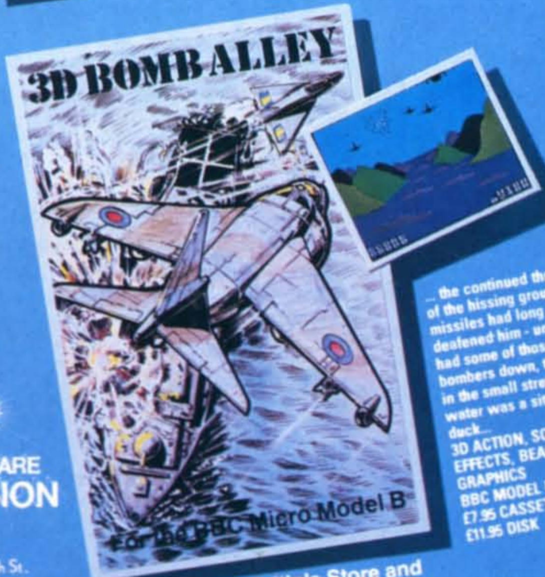
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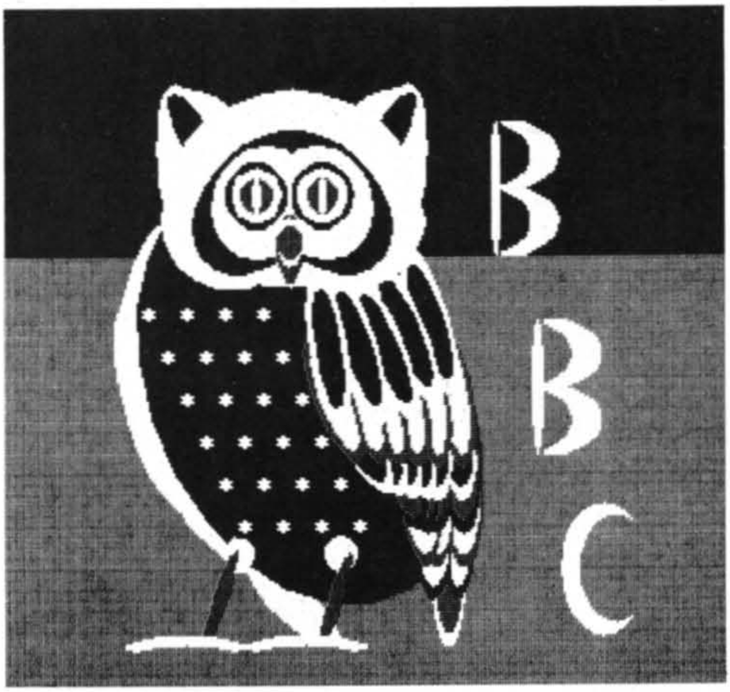
If you consider that the BBC Micro's angular graphics are strictly for squares, why not think again . . .



Pick-up your elliptical paint brush and make like a Van Gogh

By ERIC J. SIMPSON

MOST pictures and diagrams produced by BBC graphics have an angular quality about them, based as they are on triangles, rectangles and squares.

To mimic paintings it is necessary to use an underlying technique to imitate an artist's brush strokes, and the best shape for this is the ellipse, which can be round as a circle or long and thin like a line.

This program produces a screen filling four colour owl by over-painting ellipses just as a painter in oils superimposes his brush strokes.

Most readers by now will have come across programs to draw circles using the parametric form for a circle of radius (RADIUS) and centre (XC, YC):

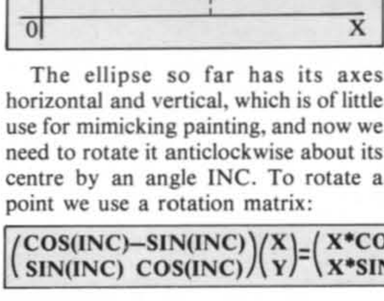
X=XC+RADIUS*COS(A)
Y=YC+RADIUS*SIN(A)

with A varying from 0 to 360 degrees to draw a full circle, with GCOL commands to vary its colour and PLOT 85 to infill triangles.

A varies in steps so that the shape produced is not a true circle but a polygon with many sides. If the step size is 15 then the shape is a 24 sided regular polygon indistingushable from a circle on a VDU.

An ellipse has two measurements to describe it, its major semi-axis MAJ and it minor semi-axis MIN. In a circle MAJ equals MIN, but if their ratio is a long way from one the ellipse is very long and thin, so the ellipse is:

X=XC+MAJ*COS(A)
Y=YC+MIN*SIN(A)



The ellipse so far has its axes horizontal and vertical, which is of little use for mimicking painting, and now we need to rotate it anticlockwise about its centre by an angle INC. To rotate a point we use a rotation matrix:

$$\begin{pmatrix} \mathrm{COS(INC)} & \mathrm{-SIN(INC)} \\ \mathrm{SIN(INC)} & \mathrm{COS(INC)} \end{pmatrix}\begin{pmatrix} X \\ Y \end{pmatrix}=\begin{pmatrix} \mathrm{X*COS(INC)-Y*SIN(INC)} \\ \mathrm{X*SIN(INC)+Y*COS(INC)} \end{pmatrix}$$

This matrix only applies to rotation about the origin, so we omit XC,YC for the time being, giving:

X=MAJ*COS(A)*COS(INC)–MIN *SIN(A)*SIN(INC)
Y=MAJ*COS(A)*SIN(INC)+MIN *SIN(A)*COS(INC)

Finally we add XC back to X giving XT and YC back to Y giving YT to produce an ellipse where we can alter its shape, size, centre and inclination to the horizontal as we wish.

When the program was first written it had a run time of between six and seven minutes. I looked for ways to shorten this and it occurred to me that a look-up table was the obvious answer.

Each point involves the calculation of eight sines and cosines for INC and A. With 24 points to an ellipse, and more than 100 ellipses in the finished picture, we would need more than 20,000 such steps.

By putting a table of sines and cosines at the start of the program at five degree

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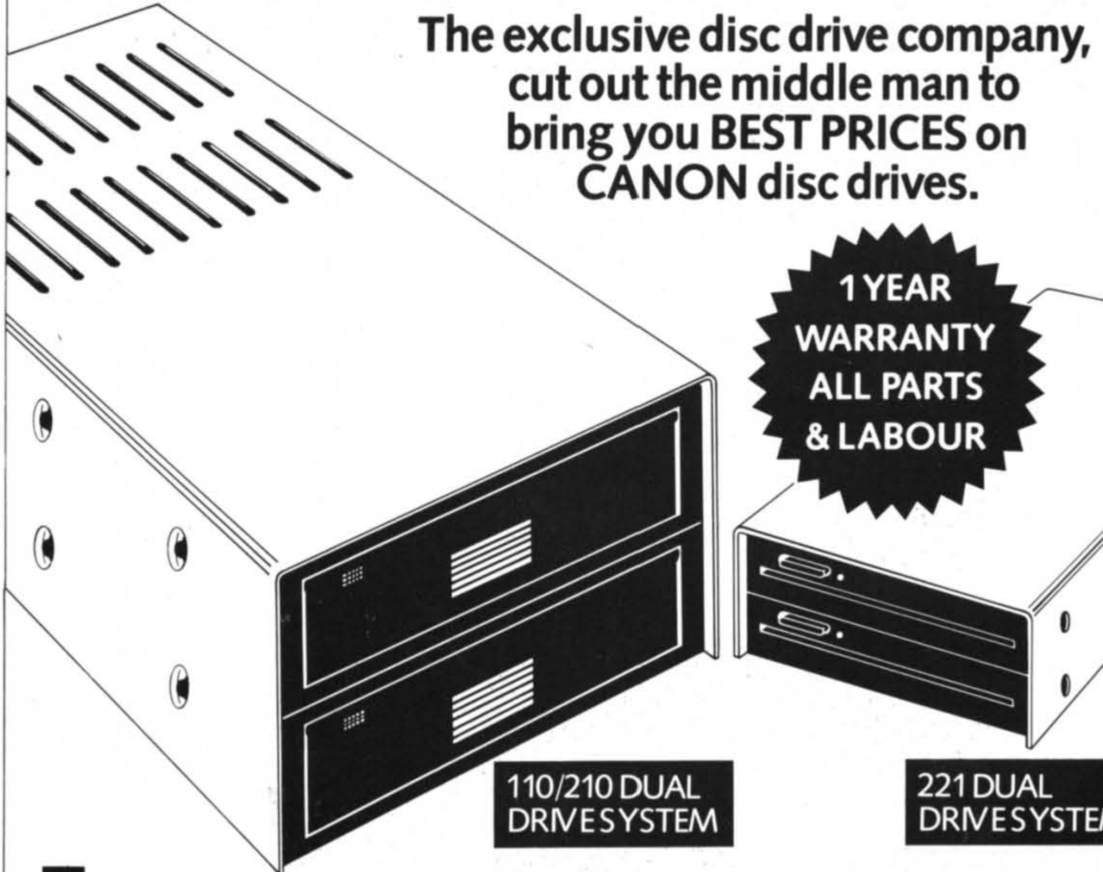

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From Page 83

intervals, less than 150 calculations are needed.

So long as A and INC are always in multiples of five, their sines and cosines as elements of the array T at the start of the program, then:

COS(INC) is replaced by **T(INC/5,1)**
SIN(INC) is replaced by **T(INC/5,2)**
COS(A) is replaced by **T(A/5,1)**
SIN(A) is replaced by **T(A/5,2)**

To complete the speeding-up, MAJ, MIN, INC, XC and YC are entered as integers. The final expressions for plotting the curves become:

```
  X=MAJ%*T(A%/5,1)
  Y=MIN%*T(A%/5,2)
XT=X*T(INC%/5,1)–Y*T( INC%/5,2)+XC%
YT=X*T(INC%/5,2)+Y*T( INC%/5,1)+YC%
```

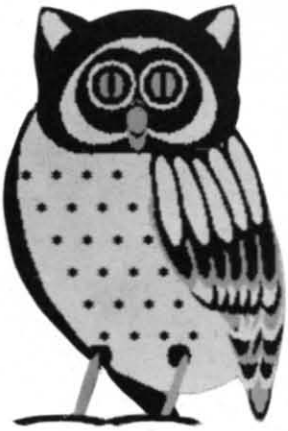
With these improvements the run time drops to about two minutes.

The look-up table occupies lines 5 to 30 in the listing. The green and white background is between lines 35 and 115. Line 55 changes red into green from the normal colours in Mode 1.

Lines 120 to 205 contain the routine for drawing an ellipse, drawing data from lines 245-845.

The data is split by REM statements to show which part of the owl is drawn by that section to facilitate modification in the final picture.

Lines 210 to 240 hold a print routine to put spots on the owl's breast.



Owl listing

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of The Micro User.

```
  5 REM Angle look-up table
 10 DIM T(72,2)
 15 FOR I% = 0 TO 72
 20 LET T(I%,1)=COS (RAD (I%*5))
 25 LET T(I%,2)=SIN (RAD (I%*5))
 30 NEXT I%
 35 MODE 1
 40 REM Program to draw B.B.C.owl
 45 REM 0=Black,1=Green,2=Yellow
   ,3=White
 50 VDU 19,1,2,0,0,0
 55 REM Draw background
 60 GCOL 0,1
 65 MOVE 1200,0
 70 MOVE 1200,1050
 75 PLOT 85,0,1050
 80 MOVE 0,0
 85 PLOT 85, 1200,0
 90 GCOL 0,3
 95 MOVE 0,650
100 MOVE 1200,650
105 PLOT 85,1200,1050
110 MOVE 0,1050
115 PLOT 85,0,650
120 REPEAT
125 REM Routine to draw ellipse
130 REM Maj & min are axes of ellips
    e ,inc is slope of major axis
135 REM xc,yc give centre,col is
     colour
140 READ maj%,min%,inc%
145 READ xc%,yc%,col
150 GCOL 0,col
155 MOVE xc%,yc%
160 DRAW xc%+maj%*T(inc%/5,1),yc%+ma
    j%*T(inc%/5,2)
165 FOR A% = 0 TO 360 STEP 15
170 MOVE xc%,yc%
175 LET x = maj%*T(A%/5,1)
180 LET y = min%*T(A%/5,2)
185 LET xt = x*T(inc%/5,1)-y*T(inc%/
    5,2)+xc%
190 LET yt = x*T(inc%/5,2)+y*T(inc%/
    5,1)+yc%
195 PLOT 85,xt,yt
200 NEXT A%
205 UNTIL inc% < 0
210 COLOUR 131
215 COLOUR 0
220 FOR J =1 TO 6
225 FOR K = 1 TO 4
230 PRINT TAB(4+J+2*K,12+2*J)"*"
235 NEXT K
240 NEXT J
245 REM Right wing
250 DATA 100,20,70,225,600,0
255 DATA 100,30,100,220,475,0
260 DATA 100,30,120,260,350,0
265 DATA 100,30,140,360,235,0
270 DATA 100,30,140,480,125,0
275 REM Ears
280 DATA 100,30,30,600,850,0
285 DATA 100,30,90,675,810,0
290 DATA 80,25,60,640,825,3
295 DATA 100,30,150,360,850,0
300 DATA 100,30,90,285,810,0
305 DATA 80,25,120,320,825,3
310 REM Body
315 DATA 350,250,120,500,450,3
320 DATA 150,200,90,480,750,0
325 REM Legs
330 DATA 25,25,0,390,200,0
335 DATA 80,10,70,357,130,2
340 DATA 25,25,0,560,200,0
345 DATA 75,10,70,550,130,2
350 REM Feet
355 DATA 100,15,0,500,60,0
360 DATA 75,10,0,500,50,1
365 DATA 100,15,0,300,60,0
370 DATA 75,10,0,300,50,1
375 REM Wings
380 DATA 100,25,90,740,160,0
385 DATA 80,20,90,740,160,2
390 REM Layer 2
395 DATA 100,25,90,755,230,3
400 DATA 80,20,90,755,230,0
405 DATA 100,30,90,715,230,3
410 DATA 80,25,90,715,230,0
415 REM Layer 3
420 DATA 100,30,90,765,280,2
425 DATA 80,25,90,765,280,0
430 DATA 100,30,90,720,280,2
435 DATA 80,25,90,720,280,0
440 DATA 100,30,100,690,280,2
445 DATA 80,25,100,690,280,0
450 REM Layer 4
455 DATA 100,30,90,765,330,3
460 DATA 80,25,90,765,330,2
465 DATA 100,30,90,720,330,3
470 DATA 80,25,90,720,330,2
475 DATA 100,30,100,690,330,3
480 DATA 80,25,100,690,330,2
485 DATA 100,30,110,660,330,3
490 DATA 80,25,110,660,330,2
```

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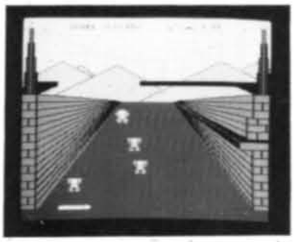

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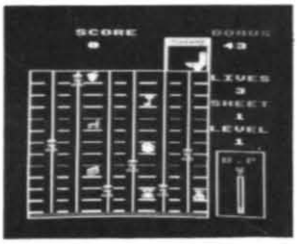
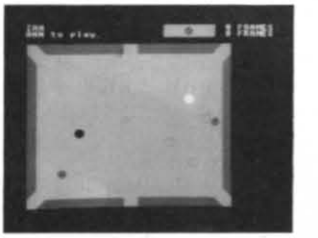


Pool



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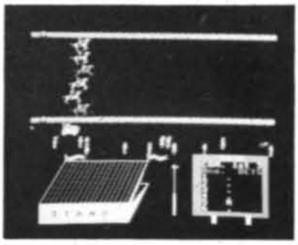

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```
*BLIST      >*BLIST 100 200
             100 PROC_FLUSH
             190 REPEAT
                  :M$=GET$
                  :UNTILM$="Y"ORM$="N"
                  :PRINT" ";M$
             200 PROC_DELAY(2)
                  :CLS
*BFIND      >*BFIND C
              100PROC_FLUSH
              200PROC_DELAY(2)
*BLIM       Defines default line numbers in
            *BLIST.
*BMERGE     Merges two BASIC programs.
            Automatically renumbers.
*BREPORT    Indicates the exact position
            within a line at which a BASIC
            program fails.
*BMEND      Mends bad programs in an
            intelligent manner.
*BMOVE      Moves a segment of BASIC program
            to a new location.
*BSR        Global search and replace for ANY
            string including keywords.
*BOVERLAY   Allows very simple overlaying of
            BASIC sections of program.
*BPACK      Selectively removes spaces and/or
            REMs from a BASIC program.
*BEQUIV     Allows passing of array names to
            PROCedures and FuNCtions.
*BCRC       Calculates Checksums values at
            regular intervals through the
            program.
*BMEM       Displays memory usage.
*BVERIFY    Compares the contents of memory
            with a disc/tape file.
*BSHIFT     Moves a BASIC program to a new
            page.  Resets TOP and PAGE.
*LOCK/      Locks and unlocks the keyboard.
*UNLOCK     For use from within a BASIC
            program.
*ARCHIVE    Produces an archive tape copy of a
            disc.
*RETRIEVE   Restores an archived tape to disc.
All the above, plus *HELP and password
protection (requires a password to be entered
on power up) with your name and address on
ROM.
```

TOOLKIT ROM plus manual £22

Send your name, address, machine serial number and password required. Note: password may include up to ten alpha numeric characters.

Please allow 28 days for delivery.

SPELLWISE

The spelling checker for use with your BBC micro and WORDWISE word processor. SPELLWISE diligently checks every word in your text against the SPELLWISE data file. When it has finished you will be left with a list of words which are incorrectly spelt or typed, or are not in the base vocabulary of more than 6000 words (3000 in the tape version). Software is included to enable you to create your own data files. The tape version requires a recorder with motor control.

SPELLWISE tapes plus manual £12
Extended version on **DISC** £18
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LANGUAGEWISE

LANGUAGEWISE will allow you to prepare text on WORDWISE in any of the following languages:-

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LANGUAGEWISE will print on an Epson FX80 (or compatible) printer and preview your text with ALL the necessary accented characters included.

```
où est le café? la grève, la fête, à la
hâte, la gîte, le rôle, en août, le garçon,
Noël, naïve, une œuvre, Œdipe
```

LANGUAGEWISE on DISC only with machine readable manual ready for printing £18

DATAWARE
FREEPOST SWINDON SN3 4BR

Owl listing

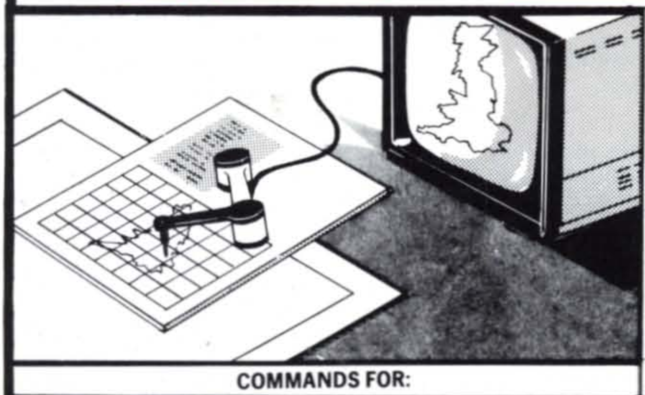
From Page 85

```
495 REM Layer 5
500 DATA 100,30,100,750,380,0
505 DATA 80,25,100,750,380,3
510 DATA 100,30,100,710,380,0
515 DATA 80,25,100,710,380,3
520 DATA 100,30,105,680,380,0
525 DATA 80,25,105,680,380,3
530 DATA 100,30,110,650,380,0
535 DATA 80,25,110,650,380,3
540 DATA 100,30,115,620,380,0
545 DATA 80,25,115,620,380,3
550 DATA 100,30,120,590,380,0
555 DATA 80,25,120,590,380,3
560 REM Layer 6
565 DATA 100,30,100,750,430,2
570 DATA 80,20,100,750,430,0
575 DATA 100,30,100,710,430,2
580 DATA 80,20,100,710,430,0
585 DATA 100,30,105,670,430,2
590 DATA 80,20,105,670,430,0
595 DATA 100,30,110,630,430,2
600 DATA 80,20,110,630,430,0
605 DATA 100,30,115,590,430,2
610 DATA 80,20,115,590,430,0
615 DATA 100,30,115,550,430,2
620 DATA 80,20,115,550,430,0
625 REM Layer 7
630 DATA 120,30,110,710,550,0
635 DATA 90,20,110,710,550,3
640 DATA 120,30,115,670,535,0
645 DATA 90,20,115,670,535,3
650 DATA 120,30,115,635,510,0
655 DATA 90,20,115,635,510,3
660 DATA 120,30,110,590,510,0
665 DATA 90,20,110,590,510,3
670 DATA 120,30,100,540,510,0
675 DATA 90,20,100,540,510,3
680 REM Head detail
685 DATA 120,100,0,380,700,0
690 DATA 120,100,0,580,700,0
695 DATA 130,90,40,430,730,3
700 DATA 130,90,140,530,730,3
705 DATA 90,80,50,430,730,0
710 DATA 90,80,130,530,730,0
715 DATA 50,50,0,420,740,3
720 DATA 50,50,0,530,740,3
725 REM Eyes
730 DATA 40,40,0,420,740,0
735 DATA 25,25,0,420,740,2
740 DATA 25,5,90,420,740,0
745 DATA 40,40,0,530,740,0
750 DATA 25,25,0,530,740,2
755 DATA 25,5,90,530,740,0
760 REM Beak
765 DATA 50,20,90,475,660,2
770 DATA 35,20,90,475,670,0
775 DATA 25,20,90,475,670,2
780 REM BBC sign
785 DATA 75,50,0,850,800,0
790 DATA 75,50,0,800,800,3
795 DATA 75,50,0,850,700,0
800 DATA 75,50,0,800,700,3
805 DATA 7,100,0,820,750,0
810 DATA 75,50,0,920,500,0
815 DATA 75,50,0,870,500,1
820 DATA 75,50,0,920,400,0
825 DATA 75,50,0,870,400,1
830 DATA 7,100,0,890,450,0
835 DATA 100,70,90,1000,175,0
840 DATA 80,60,90,1020,175,1
845 DATA 1,1,-1,1,1,1,
```

This listing is included in this month's cassette tape offer. See order form on Page 181.

Robot PlotteR

£59.50 INC. VAT CARRIAGE £3.00



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Put some BOUNCE into Easter with 12-year-old Martin Hollins's sparkling program . . .

EAS

WHY don't you go to work on the Micro-egg maze game and see how many Easter chicks you can hatch?

The object is to help the chicks to hatch by collecting the four eggs in the corners of the maze and taking them one at a time to the centre where they will become Easter chicks.

Trying to stop you is a bouncing spring rabbit which chases you around the maze.

If he catches you one of your three lives is lost and you have to start again.

However if you outwit the rabbit and hatch all four eggs you move onto the next sheet – which has two rabbits chasing you.

With each new sheet the number of rabbits increases, to a maximum of eight at the highest level.

Your only defence against these predators is a carrot which you can drop anywhere in the maze.

The first rabbit to reach the carrot will stop for a random length of time to eat it.

You cannot kill the rabbit – only slow it down.

If it changes direction you can lay another carrot in its path, but the first one will disappear.

When you have lost all three lives your total score and the hi-score is displayed and an option for another game offered.

Your score increases by a random amount depending on the time it takes the rabbit to eat the carrot, and also by five points for every egg picked up.

A further five points are gained when the egg hatches.

The keys S (to slow down play) and F (to return to normal fast play) add an extra dimension for the more inexperienced or younger player.

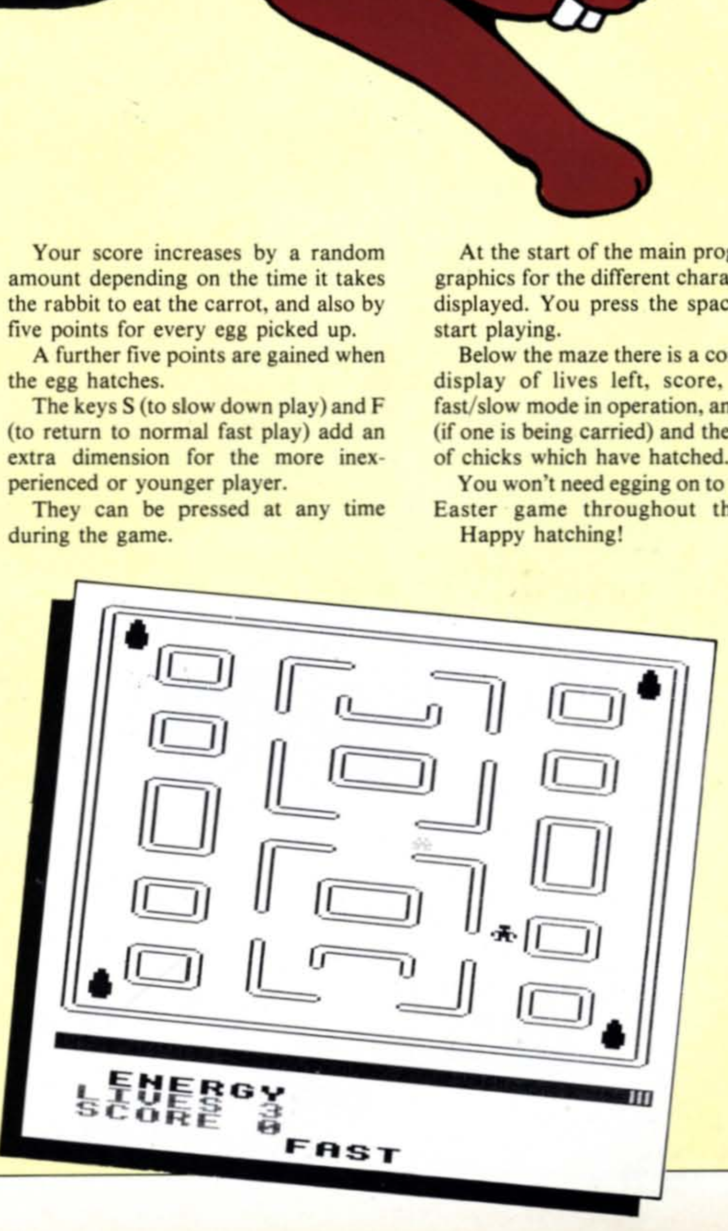
They can be pressed at any time during the game.

At the start of the main program the graphics for the different characters are displayed. You press the space bar to start playing.

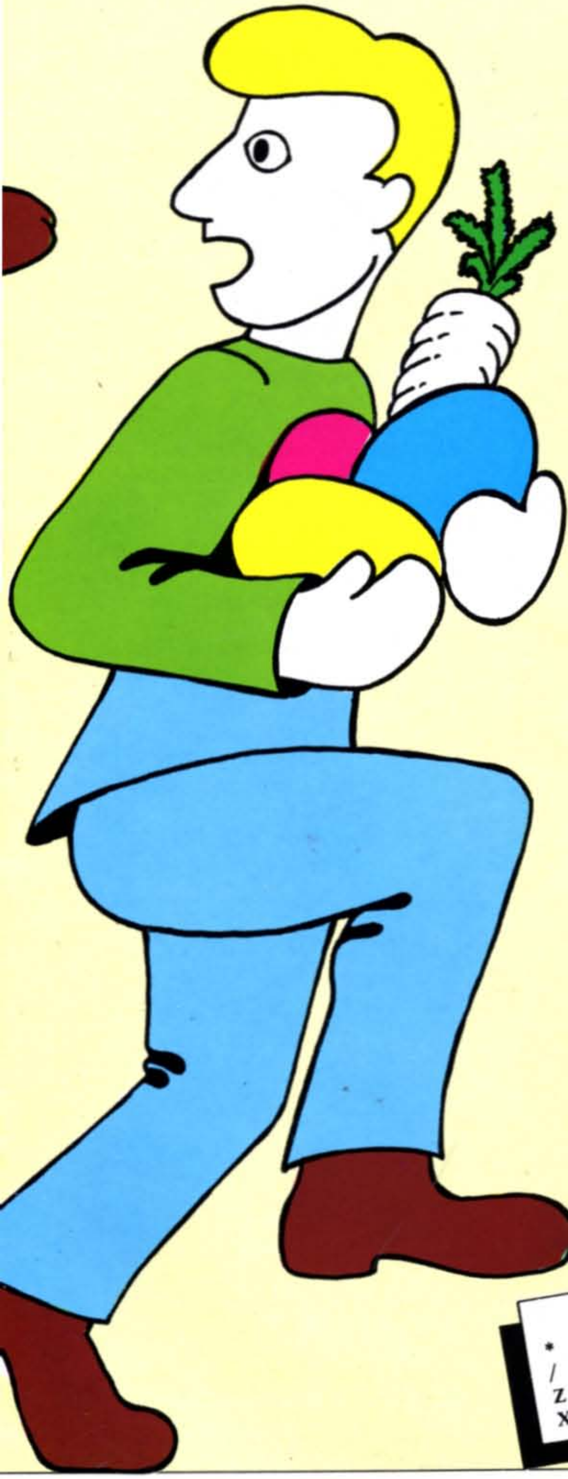
Below the maze there is a continuous display of lives left, score, energy, fast/slow mode in operation, and an egg (if one is being carried) and the number of chicks which have hatched.

You won't need egging on to play this Easter game throughout the year.

Happy hatching!



TER MAZE



MAJOR PROCEDURES

PROCINIT	Initialises all variables, strings and characters.
PROCSCREEN	Draws maze.
PROCTEXT	Prints score/lives/energy/egg/chicks at bottom of maze.
PROCMOVE	Moves person.
PROCRABBITSMOVE	Moves rabbit(s).
PROCEGGS	Checks to see if you are on an egg.
PROCCHECK	Checks to see if you are dead.
PROCSPLAT	Kills person and takes away a life.
PROCFEED	Sets up variables for carrot to appear.
PROCPFEED	Prints carrot if "space" pressed.
PROCSTOPRABBIT	Stops a rabbit for random time if he lands on carrot.
PROCNSHEET	Sets up new sheet.
PROCEASYDIF	Checks to see if F or S pressed for fast or slow mode.

MAJOR VARIABLES

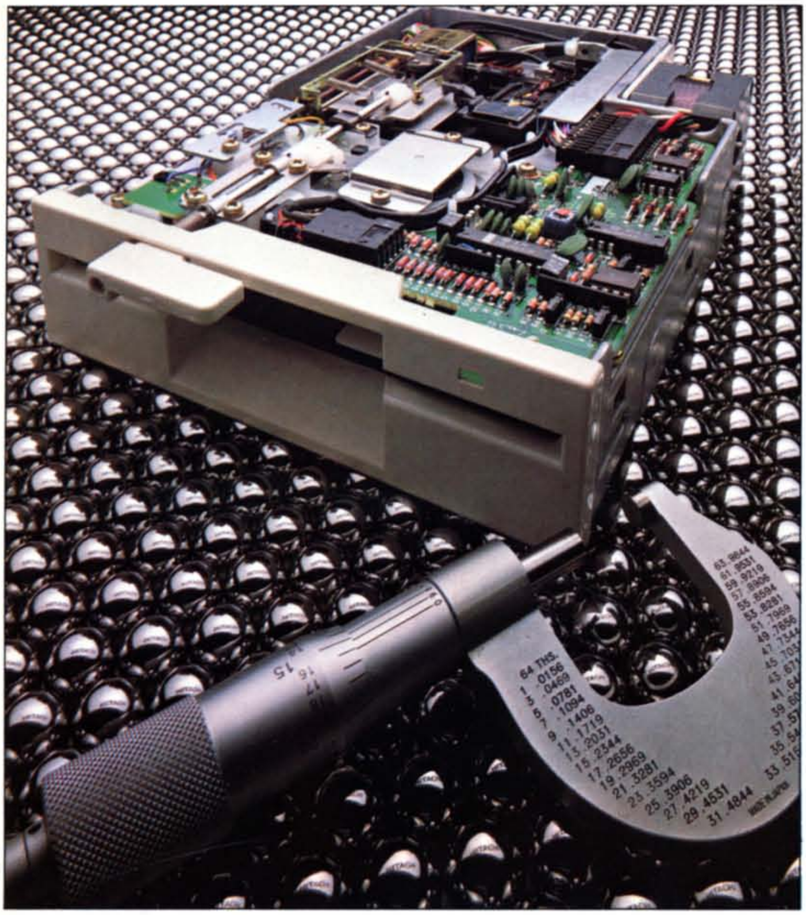
A% & Z%	General loop counters.
B% (N)	True or false if egg is in a corner.
BO%	Bounce for rabbit.
E%	Energy.
FE%	True or false for carrot on screen.
FX% and FY%	X and Y co-ordinates of carrot.
H%	Hi-score.
L%	Level.
LI%	Lives.
RX%(N) and RY%(N)	X and Y co-ordinates of carrot.
S%	Score.
SL%	True if slow mode chosen.
X%, Y%	X and Y co-ordinates of person.
CARRY%	True if you are carrying an egg.
EGG%	Number of eggs left.
TRU%	True if rabbit lands on person or your energy runs out.
A$ (N)	Nth line of maze.
CHICK$	Chick.
DROP$	How many chicks you have hatched.
EGG$	Prints an egg.
P$	Prints the person.
SPA$	Prints a space over an egg.

KEYS

*	Up	Space	Drop a carrot
/	Down	S	Slow down
Z	Left	F	Return to fast play
X	Right	P	Pause (press P again to re-start)

Full listing starts on Page 163

HI-TECH MEANS HITACHI.



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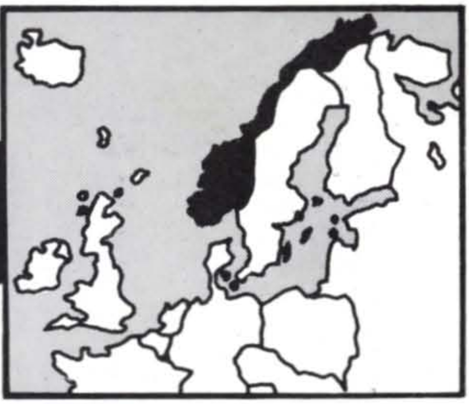
From ARE LEISTAD in Oslo, two programs to speed data transfer via the BBC Micro



The Norwegian Connection

THE BBC Micro is ideally suited for the transfer of data over the telephone. In Norway we regularly transfer programs, data files and memory blocks via the RS 423 port with a 300 baud modem, which is just as readily available in the UK.

All you need is the software given here.

Program I automatically places the transferred data in the same memory locations in the receiving BBC Micro as in the transmitting one. This is the program that we use most of all.

Program II enables the receiver to place the received file wherever he wishes in memory by specifying the start address.

This can be quite useful when transferring programs from cassette-based to disc-based computers and vice versa. It is also a little bit more memory efficient.

Both listings are well labelled with REMs to explain how they work.

The modems must, of course, be connected and working properly before any communication can start. One can use a relatively cheap and simple modem, either acoustic or direct-coupled. There is no need for modems offering duplex, auto-dial or other facilities.

This is the procedure we use:

1. Put both BBC Micros in Mode 7 (to save memory).

2. LOAD or *LOAD the transmitting micro with the desired program or file. Don't forget to note the start address and length.

3. Set PAGE to a high value in both micros – say &7000 – and CHAIN program I or II.

4. Select RX or TX as required and enter the appropriate addresses or lengths.

5. Set the modem to the correct mode, such as call/answer or transmit/receive. Start receiving and transmitting, and wait for the process to be completed, which is indicated by a beep.

6. When completed, the transferred data can be SAVEd or *SAVEd onto disc or tape. When using normal SAVE with Basic programs remember to reset PAGE and type OLD. Machine code programs, data files and such must be *SAVEd in the normal manner, using the correct addresses.

This method works very well with Basic and machine code programs, data files or whatever is present in the BBC Micro's memory.

The programs are only tested on 300 baud but they will probably run at much higher speeds due to the immense speed possible with the BBC Micro.

Program I

```
 10 REM RS 423 TRX PROGRAM
 20 REM TESTED ON OS 1.20
 30 REM ARE LEISTAD 1984
 40 REM ===============
 50 REM RX SPEED
 60 *FX7,3
 70 REM ===============
 80 REM TX SPEED
 90 *FX8,3
100 REM ===============
110 REM R/W LOCATION:
120 trx%=&FE09
130 REM ===============
140 REM STATUS REGISTER:
150 REM BIT 0 SET = BYTE RECEIVED
160 REM BIT 1 SET = CTS
170 st%=&FE08
180 REM ===============
190 PRINT '"TX OR RX ?"'
    :REPEAT
    :x$=GET$
    :UNTIL x$="T"OR x$="R"
```

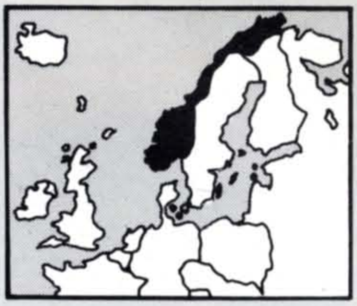
→

From Page 91

```
200 IF x$="R"
    :PROCrx
210 IF x$="T"
    :PROCtx
220 END
230 REM ===============
240 DEF PROCrx
250 PRINT '"PRESS ANY KEY TO START
     RX"
260 x=GET
270 PRINT '"Waiting for TX..."
280 PROCnext
    :histart%=?trx%
    :REM GET HIBYTE OF START
290 PROCnext
    :lostart%=?trx%
    :REM GET LOBYTE OF START
300 PROCnext
    :histop%=?trx%
    :REM GET HIBYTE OF STOP
310 PROCnext
    :lostop%=?trx%
    :REM GET LOBYTE OF STOP
320 start%=histart%*&100+lostart%
    :REM CALCULATE START
330 stop%=histop%*&100+lostop%
    :REM CALCULATE STOP
340 PRINT '"START  : &";~start%
350 PRINT "STOP   : &";~stop%
360 PRINT "LENGTH : &";~stop%-start%
370 FOR loc%=start%TO stop%
380 PROCnext
390 ?loc%=?trx%
    :REM PUT RECEIVED BYTE IN MEMORY
400 NEXT
410 PROCbeep
420 ENDPROC
430 REM ===============
440 DEF PROCtx
450 INPUT "START  "start$
    :start%=EVAL start$
460 INPUT "LENGTH "length$
    :stop%=start%+EVAL length$
470 histart%=start% DIV &100
    :lostart%=start% MOD &100
480 histop%=stop% DIV &100
    :lostop%=stop% MOD &100
490 PRINT '"PRESS ANY KEY TO START
     TX"
500 x=GET
    :ti=TIME +250
    :REPEAT UNTIL TIME >ti
    :REM WAIT TO ENSURE RX IS READY
510 PRINT '"Transmitting..."
520 PROCcts
    :?trx%=histart%
    :REM SEND HIBYTE OF START
530 PROCcts
    :?trx%=lostart%
    :REM SEND LOBYTE OF START
540 PROCcts
    :?trx%=histop%
    :REM SEND HIBYTE OF STOP
550 PROCcts
    :?trx%=lostop%
    :REM SEND LOBYTE OF STOP
560 ti=TIME +50
    :REPEAT UNTIL TIME >ti
    :REM WAIT TO ALLOW RX TO CALCULA
    TE ADRESSES
570 FOR loc%=start%TO stop%
580 PROCcts
590 ?trx%=?loc%
    :REM TRANSMIT BYTE FROM MEMORY
600 NEXT
610 ti=TIME +250
    :REPEAT UNTIL TIME >ti
    :REM WAIT FOR TX BUFFER TO
     EMPTY
620 PROCbeep
630 ENDPROC
640 REM ===============
650 DEF PROCcts
660 REM WAIT FOR CTS
670 REPEAT UNTIL (?st% AND 2)=2
680 ENDPROC
690 REM ===============
700 DEF PROCnext
710 REM WAIT FOR NEXT BYTE
720 REPEAT UNTIL (?st% AND 1)=1
730 ENDPROC
740 REM ===============
750 DEF PROCbeep
760 PRINT '"TRANSFER COMPLETE"
770 SOUND 1,-15,53,10
780 SOUND 1,-15,101,10
790 ENDPROC
```

Program II

```
 10 REM RS 423 TRX PROGRAM
 20 REM TESTED ON OS 1.20
 30 REM ARE LEISTAD 1984
 40 *FX7,3
 50 *FX8,3
 60 REM ============
```



```
 70 REM R/W LOCATION:
 80 trx%=&FE09
 90 REM ============
100 REM FE08 STATUS REGISTER:
110 REM BIT 0 SET = BYTE RECEIVED
120 REM BIT 1 SET = CTS
130 st%=&FE08
140 REM ============
150 PRINT '"TX OR RX ?"'
    :REPEAT
    :x$=GET$
    :UNTIL x$="T"OR x$="R"
160 INPUT "START  "start$
    :start%=EVAL start$
170 INPUT "LENGTH "length$
    :stop%=start%+EVAL length$
180 REM ============
190 IF x$="T"
    :PRINT '"PRESS ANY KEY TO START
     TX"
    :x=GET
    :ti=TIME +250
    :REPEAT UNTIL TIME >ti
    :PROCtx(start%,stop%)
200 IF x$="R"
    :PRINT '"PRESS ANY KEY TO START
     RX"
    :x=GET
    :PROCrx(start%,stop%)
210 SOUND 1,-15,150,10
220 END
230 REM ============
240 DEF PROCrx(start%,stop%)
250 FOR loc%=start%TO stop%
260 REPEAT
    :UNTIL (?st% AND 1)=1
    :REM Wait for next byte
270 ?loc%=?trx%
280 NEXT
290 ENDPROC
300 REM ============
310 DEF PROCtx(start%,stop%)
320 FOR loc%=start%TO stop%
330 REPEAT
    :UNTIL (?st% AND 2)=2
    :REM Wait for CTS
340 ?trx%=?loc%
350 NEXT
360 ENDPROC
```

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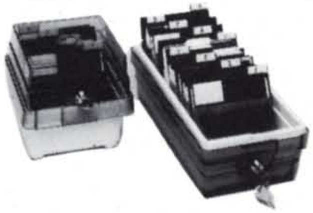

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★ ASTRONOMY ★

'SKY-BABY' is a highly sophisticated scientific program running on BBC-B (cassette loading). It caters for astronomers ranging from complete beginners to advanced amateurs and aspiring professionals, and for educational institutes.

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BMU4/84

Feeling a little under par? Well why not drive away the blues and

Microgolf get
in the
swing

By F. McPHERSON

HAVE you ever wondered what on earth it is that people see in knocking a little white ball about in the pouring rain?

Well our MicroGolf program is a fantastic simulation of the sport. All the thrills, frustrations and irritations of the original game are here – all bar the rain, that is.

Firstly, you decide how many holes you wish to play. You are then given a plan and a cross-section of each hole.

From this you must decide the direction and weight of club you need to get on the green. Once on the green you have to get into the hole.

The weight of the club varies between 1 and 30. You specify the angle by giving it in degrees between 0 and 360, where 0 is vertically upwards, 90 horizontally right and so on.

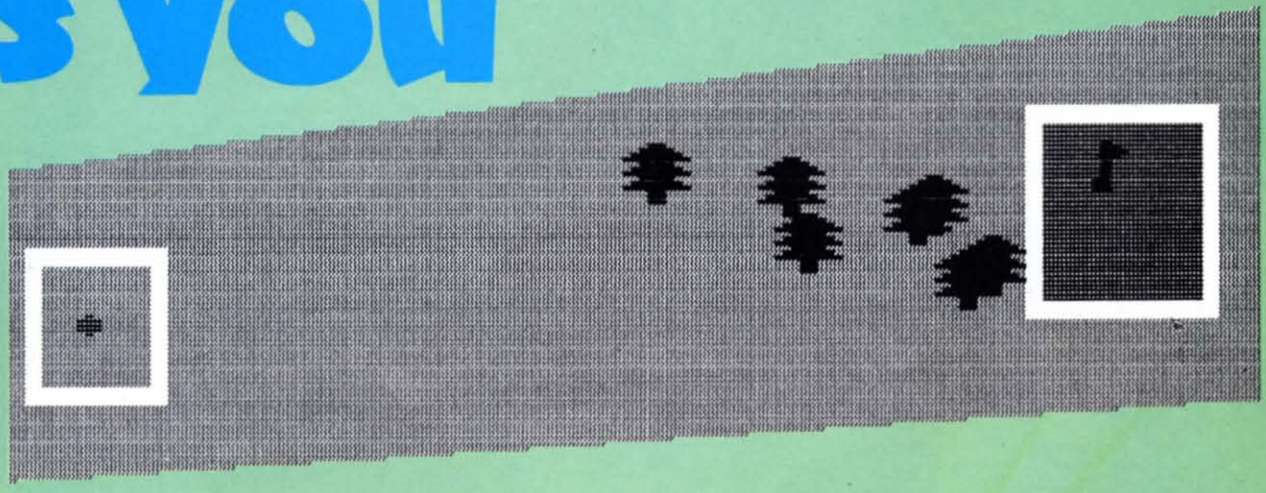
If you land in a tree you lose a shot, and you then have to go round it without hitting it again. If you land in the rough you have to hit the ball twice as far to go the same distance.

When you have completed the required number of holes you are given a scorecard showing each hole, how long it was and how many shots you took.

To aid those of you who can't resist tinkering with programs, we've included an outline of the lines, procedures and main variables.

putt yourself onto our green – we've got this game off to a tee!

s you



Lines and procedures

Line 10 Turns off auto repeat.

Line 20 Turns off the escape key for all operating systems.

Lines 30-100 Sets up the beginning procedures.

Lines 110-180 Main loop, which calls up other procedures.

PROChitball This firstly asks for the direction and club size, then moves the ball and checks if it hits a tree or where it lands.

PROCsetup This draws the plan view and sets up the colours and some of the variables.

PROCsqu Colours in a specified square.

PROCgreen When you land on the green this procedure draws the enlarged green, with the hole and the ball on it.

PROChoriz Draws the cross-sectional view of the hole.

PROCdoneit When you have completed the hole this procedure tells you how many shots it took you.

PROCcharset Defines all the characters.

PROCdrclub Draws the club.

PROCgolfer Draws the golfer and also makes his club swing.

PROCintro Prints up the introduction.

PROCd Waits for key to be pressed then clears the screen and continues with the program.

PROCdrfarway Draws the fairway.

PROCscorecard Prints up the scorecard.

Main variables

S%	Shots taken.
HO%	Number of the hole being played.
G%	A flag that is set when the ball is on the green.
D	Direction of the ball.
C	Club size.
J%	Y coordinate of the cross-sectional golf ball.
X & Y	Coordinates, of the plan view, of the golf ball.
PO%, P1%	Colour of the screen just in front of the ball.
MX%, MY%	Coordinates of golfer.
XG%, YG%	Coordinates of the green.
XH%, YH%	Coordinates of the hole within the green.
L%	Distance between tee and hole.
CX%, CY%	Coordinates of the end of the club.
HOLES	Number of holes the player requested to play.

Microgolf listing

```
    1 REM MICROGOLF
    5 REM MICRO USER
    7 REM (C) 1984
   10*FX11,0
   20IF INKEY(-256)=0 THEN ?&226=1 ELS
E *FX229,1
   30MODE7
   40PROCintro
   50MODE 2
   60VDU 23;8202;0;0;0;
   70PROCcharset
   80S%=0
   90PROCsetup
  100HO%=0
  110REPEAT
  120PROChitball
  130IF PO%=8 OR PO%=15 OR PO%=11 THEN
 MODE7:PROCdoneit:MODE2:VDU20
  140IF (PO%=8 OR PO%=15 OR PO%=11) AN
D HO%<>HOLES THEN PROCsetup
  150UNTIL HO%=HOLES
  160MODE7
  170PROCscorecard
  180END
  190:
  200:
  210DEF PROChitball
```

Turn to Page 171

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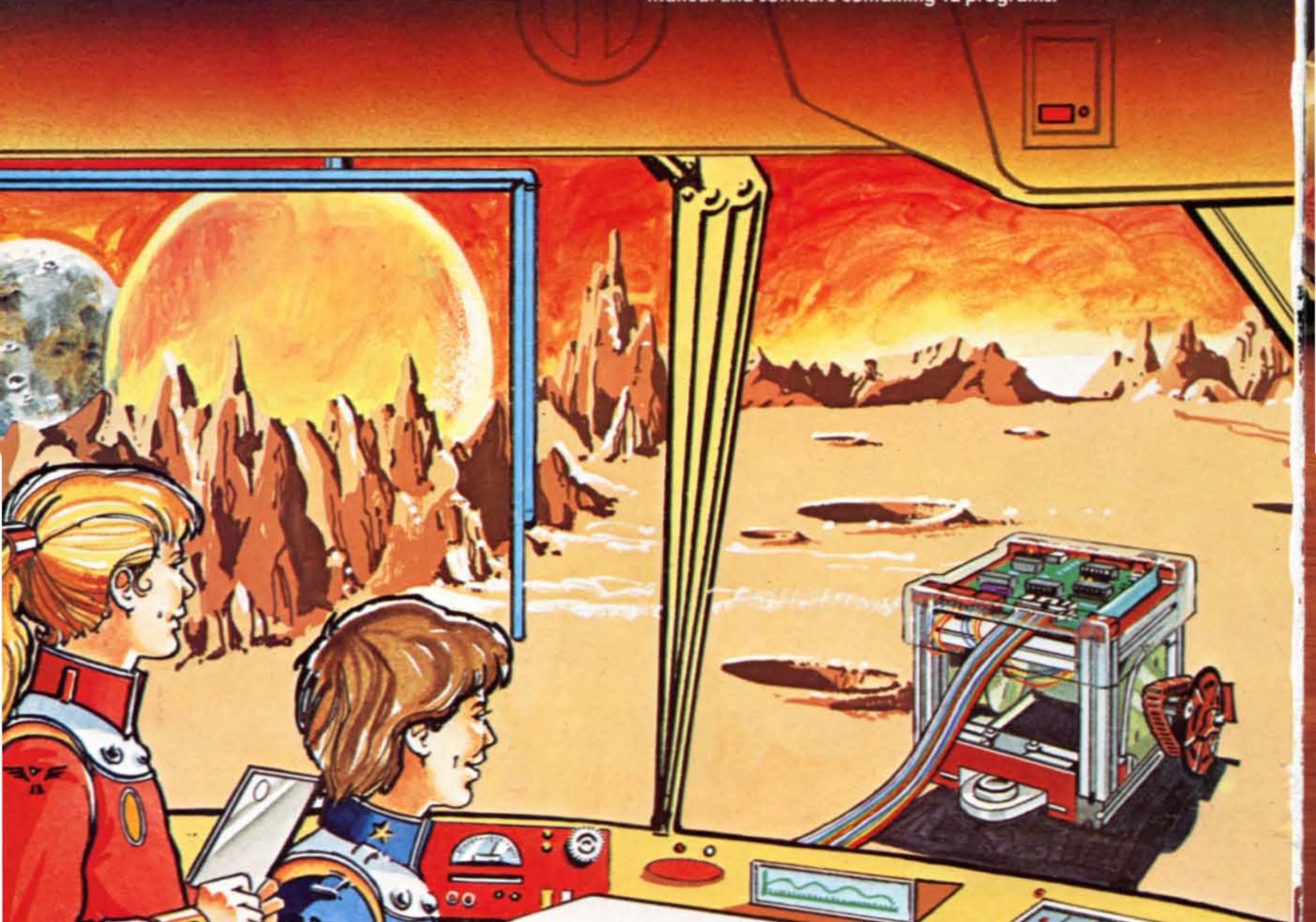

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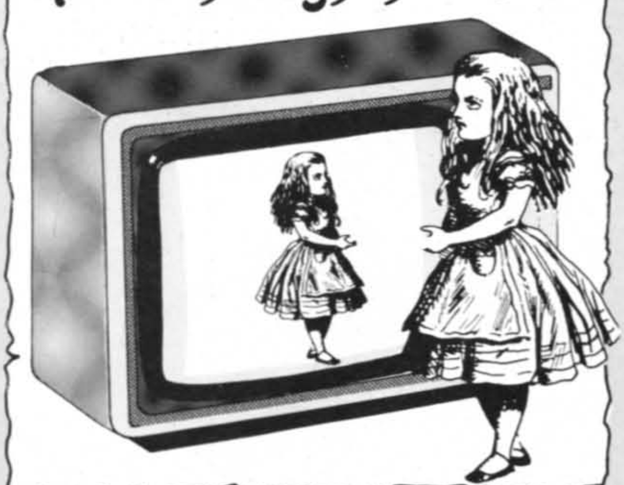
Alice through the VDU



Our monthly foray into Adventure games

Creating (and solving) adventures

A NUMBER of people wrote in to *The Micro User* to tell M.B. Hollands *(Micromail, October)* how to deactivate the robot in Countdown to Doom.

The answer is to "write steep, read flat" the message:

```
SEDLRAZIEOYZSTBFTAHOLOBET
```

on the artifact. That is, put it in a five by five matrix.

To save you the trouble of decoding it, the answer is:

```
UP*EJTBCMF*UIF*SPCPU*TBZ*GMFAA
```

Of course, I've had to encode this by shifting up the letters one place in the alphabet. The * simply stands for a space.

This is far simpler to decode than the algorithm I gave to encode where to find the Pirate's Chest in Colossal Cave. Which do you prefer – or would you prefer not to have answers published at all, but more clues?

Some of you have got stuck in other parts of this adventure.

I haven't got a listing but having looked at the other three Acornsoft games, I'm sure this one can be broken in similar fashion.

However I appreciate not everyone can afford a lineprinter so here are some of your Countdown problems:

Where are the crystals and the monster? Is there anything under the swamp? How can you stop the floating platform from following you?

Even with a listing, this last problem appears to be quite difficult and I will deal with such problems later.

There were some critical letters. A. Ashton warns that the BBC version of Hobbit, although the same price as other versions, is text only.

Actually I haven't been very impressed with graphic adventures so far. They tend to be rather tedious as you wait for the usually inanimate picture (which can cost a thousand words) to be drawn.

It is also quite impossible to represent some scenarios such as: "You are in a vast hall stretching into the distant gloom. Wisps of vapour dance as though they were alive. A little dwarf appears, curses and throws an axe at you. It misses".

An interesting letter came from David Hampton:

Dear Alice,

I read your review of six adventure programs with great interest. Adventure players need articles like this because it's very hard to tell how good they are until you've spent some time playing them.

May I suggest, however, that you have another think about how to judge adventures. Please don't assume games that SAVE quickly are not complex. It only takes a few bytes to say which room you're in, and so on.

I'm all for structure, but it does make programs larger. So the best way to judge an adventure is to ask how many moves it takes to complete, how many rooms it has and, most important of all, how much text there is in the room descriptions and messages.

The reason I'm giving you all this brotherly advice is that you will doubtless review my own adventure soon – vital statistics 105 rooms, approximately 290 moves and 23k of compressed text. I want to make sure you appreciate "Title Deleted" fully!

Oh yes – on expletives – you're a prude, Alice!

A bit of praise, a bit of humble criticism and a bit of publicity – well thanks Big Brother but, in my humble experience, the shorter the SAVE the poorer the game, but I will continue to judge mainly on the listing – if I can get one.

As for structure, it is also my experience that a badly laid out program tends to have more bugs. There are techniques for writing a program so you can understand it yourself, and then altering it so that cheats like myself find it almost impossible to unravel.

A simple trick is to use meaningful identifiers and then reduce them to a single letter when that part of the program is working.

Another technique is to have the

→

From Page 99

program compiled, but this tends to make it bigger. Of course the best way is to compress the messages as in Level 9's A-code (as Hampton appears to have done).

I wholly agree that an adventure should inform the potential buyer about the number of rooms, puzzles, size, whether text or not, and also give some measure of how difficult the games is in terms of moves and/or time.

But this is still not sufficient to judge its appeal. Obviously this is a subjective opinion but there are now at least 10 books on the market which "teach you how to create your own exciting adventure".

Countless magazine articles also deal with the subject, and now Gilsoft has issued The Quill which "allows even the novice programmer to produce high speed machine code adventures of superior quality – without any knowledge of machine code".

This advert reminds me of the famous machine in the Ladogan Academy (see Gulliver's Voyage to Laputa by Jonathan Swift) with which "the most ignorant person . . . may write books in philosophy, poetry, politics, law, mathematics and theology without the least assistance from genius or study".

Swift was satirising a machine which actually did exist at the time.

The prospect of more adventures being written by novices is not good news because, even now, half the programs I get to review are so lacking in originality that I want to stop up my nostrils with tobacco and refuse to even mention their titles.

All that these books, magazine articles and The Quill have done so far is help the reader with the mechanics of designing and handling a fairly simple dynamic database, and I am irritated when they claim to tell you everything you need to know.

You might just as well buy a book that will teach you how to write a symphony.

It is often said that reviewers are barren, destructive old maids. We who ourselves cannot create take delight in criticising those trying to earn an honest buck.

To a certain extent this is true. The more games one tries the more unlikely and difficult it is to be excited or amused, and this breeds a certain arrogance.

For example, I am quite confident that I could write a better adventure than most products on the market but I'm not going to until I get a firm contract, money in advance and a guaranteed hype in full colour in all the magazines.

The result would not have the slightest shred of originality because Barbara Cartland does very well with her efforts which are junk compared to Shakespeare, Swift, Dickens and Joyce.

Who wants to read Finnigan's Wake from beginning to end every month when a cheap bodice-ripper will pass a few pleasant hours?

Being a successful adventure writer means you must hack in a junk market. A good gimmick, a few puzzles and a technicolour advert is how to really collect the treasure.

A gimmick is something "designed to attract attention and publicity", so first ask yourself – how is your game going to be different?

How about an electric shock every time the player gets it wrong? Not likely to sell to kids or old age pensioners.

How about a treasure hunt? Already done in Pimania – you need a sponsor, it cuts down the profits and is dead when someone is even suspected of having solved it.

How about lifting the plot of a book? Now that's a good gimmick because there are thousands of books but they mostly have a fixed plot.

How about an educational adventure like building a hydrogen bomb? Well, there's a thought – after all the first problem ever run on the Eniac computer in 1946 was to help design a more efficient atomic bomb.

The point is that ninety per cent of adventures are just so many rooms, so many objects, so much "do this, do that, do the other" until you can pass an obstacle.

It's all been done before, and mazes are boring unless, like Acornsoft, you can come up with a couple of new twists to solving them.

All adventures should have puzzles. You don't have to be to original, in fact rather the opposite. Take Gollum's riddle in The Hobbit:

"What walks on four legs in the morning, two in the afternoon and three in the evening?" – That one is as old as the Sphinx but the real answer, nowadays, is Jake the Peg (diddle iddle iddle um) because a stick ain't a leg.

However, as I said, the paradox of puzzles is the older they are the better, providing you can dress them up a bit.

You are in front of Aladdin's Cave. What should you say?

You find some charcoal and sulphur near the village rubbish heap on which the peasants tend to urinate. Would you know what to do?

You meet a poker player who invites you to take five cards from his pack. He then draws five himself. You can now change any of your cards; your discards are thrown away. The poker player may now draw likewise and, if he has a better hand than yours then he shoots you. Would you know how to win every time?

The answer won't be in the listing for this one obviously, and there are thousands of similar puzzles, but the trouble is that they can be quite tricky to program.

Finally the toughest problem – selling your work. Pick a reputable software house and send a sample program plus an explanatory solution.

I actually get the occasional program to referee and become irritated if I don't also get a clear description of what is original in the game, what the solutions are plus a map and a listing.

The reviewer and possible distributor are mainly concerned with assessing the game's market value and not in admiring your ingenuity by trying to solve it.

There was a time when I enjoyed solving any old adventure, but the fun wears thin after wrestling with some yahoo program. The hardest to solve are often the worst, badly written, full of random numbers, dead ends, irrelevant rooms and objects, no story line, poor clues and rotten puzzles.

Occasionally I might be intrigued enough by the listing to actually play a game just to see how quickly I can break it.

For example, I liked the look of Gateway to the Skies by Solar Software and spent about five hours on the listing before actually running it.

It is a pleasant program to cheat your way through because the author has laid out the rooms, their descriptions, directions and objects contained in a very clear and readable way – it's a model of how to write such programs.

The author has also put in the neat gimmick of having his adventure in two sections. You have to collect the right objects in the first section before you turn the cassette over and start the second half.

To make the second half work you need to know a password which will create a special SAVE file in the first half. This is a new idea to me so I had to try it.

There are about 100 rooms, 50 objects and 30 puzzles in the game and the idea of splitting it into two parts works very well.

You get the equivalent of a Level 9 game without having to cram the machine with the compressed tangle David Hampton seems to advocate.

I expect to see many more two-part games – you get a good long run for your money this way.

Just to prove I am not a barren old maid, I have written an adventure for you lot to knock – it's called Judgement Day and picks up where most adventures finish.

Anyone can try to solve it. You don't even need a computer because you have the complete listing and it's less than 50 lines long.

But – so you can fully appreciate it – the gimmick is that the answers are not in the program.

What you have to find is a set of commands which guarantee you can always open Porta Coeli – you've got to be able to do it every time.

There is a prize for the best answer, and I would also be interested in any similar mini-adventures readers can create.

Keep them less than 100 lines, put them on tape, give some idea of the gimmick and the solutions and we might publish them – your first step to fame and fortune.

Finally, it's no good writing long letters about how you are stuck in a game. You should keep the query short and to the point, for example: *Wizard and Princess by On-Line. How do I cross the chasm? A. Lamport, 99 Bushy Mill Crescent, Watford WD2 4RB.*

This should get an answer, but despite the flattery the following won't: *Castle of Riddles by Acornsoft. I think I've got everything, so how do I finish? P.S. Your magazine is great.* **Alice**

You can write to Alice c/o The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. Don't forget to include a stamped addressed envelope.

```
  5 sign=0
 10 I$="0  "
 20 IF sign=0
    THEN sign=28
    ELSE sign=14316
 30 tumble=sign
 40 PRINT "    You are in the Judgeme
    nt Room."
 50 PRINT "A pair of scales stand
     by Pearly Gates."
 60 PRINT "Above the Gates is a sign
     which reads:-"
 70 PRINT "          29 IS PERFECT"
 80 PRINT "There is an ALIDUOT safe
     by the scales."
 90 PRINT "The number on the dials
     is ";sign
100 INPUT "You dial the number-"
    ,N$
110 click=tumble/2
120 FOR I=1 TO tumble/3
130 IF tumble MOD I=0
    THEN click=click+I
140 NEXT I
150 IF VAL (N$)=click
    THEN PRINT "CLICK---"
    ELSE 440
160 tumble=click
170 IF tumble=sign
    THEN PRINT "The safe opens"
    ELSE 100
180 PRINT "Inside are weights ranging
     from 1 to 28 LBs"
190 take=0
200 INPUT "What now",C$
210 IF INSTR(C$,"DROP")>0
    THEN 320
    ELSE take=take+1
220 IF INSTR(C$,"TAKE")=0 OR
    INSTR(C$,"LB")=0
    THEN 200
230 W$=MID$(C$,6,INSTR(C$,"LB")-6)
240 IF VAL (W$)<1 OR VAL (W$)>28

    THEN 440
250 PRINT "You take a ";W$;"LB weight
    "
260 I$=I$+LEFT$(W$+"  ",3)
270 IF take<4
    THEN 200
    ELSE IF take >4
    THEN 440
280 PRINT "The sign over the door
     now reads "
290 sign=RND(81)-41
300 PRINT "DROP ";sign;"LBs on the
     right scale"
310 GOTO 200
320 IF INSTR(C$,"LEFT")>0 OR
    INSTR(C$,"RIGHT")>0
    THEN 350
330 PRINT "Drop on right or left
     scale"
340 GOTO 410
350 W$=MID$(C$,6,INSTR(C$,"LB")-6)

360 R=INSTR(I$,W$)
370 IF R=0
    THEN 440
    ELSE I$=LEFT$(I$,R-1)+MID$(I$
    ,R+3)
380 IF INSTR(C$,"LEFT")>0
    THEN sign=sign+VAL (N$)
    ELSE sign=sign-VAL (W$)
390 PRINT "The sign now reads ";sign;
    "lbs"
400 IF sign=0
    THEN PRINT "The gates are open
     but are you perfect?"
410 INPUT "What now",C$
420 take=take-1
430 IF take+INSTR(C$,"DROP")>0
    THEN 320
440 PRINT "The safe explodes - you
     go to hell"
450 INPUT "Try again sinner",C$
460 IF LEFT$(C$,1)="Y"
    THEN 10
    ELSE STOP
```

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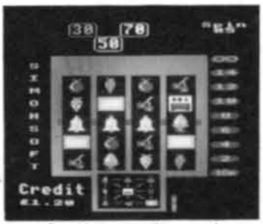

Actual screen photograph

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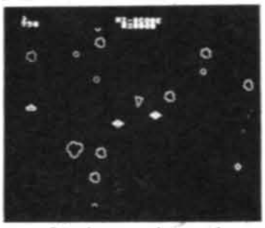

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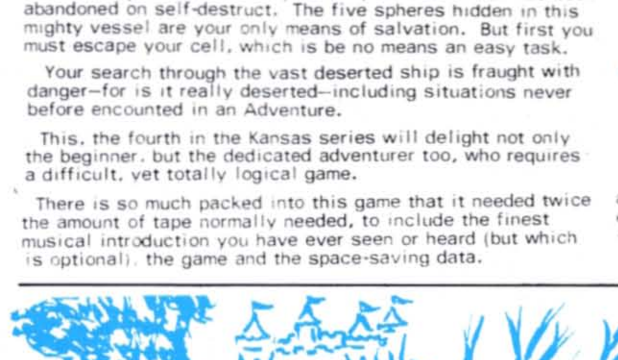

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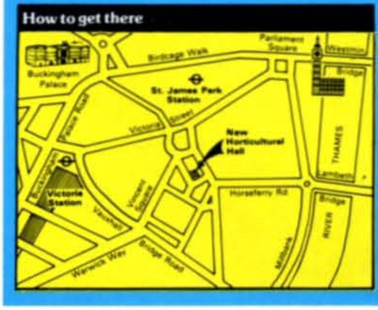

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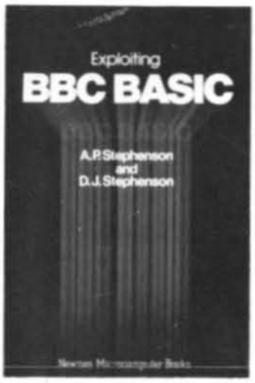

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MIKE COOK'S PROBLEM PAGE

Not making the most of my dual cassette system

I have found the dual cassette system dlscribed in the Body Building Course in the August, 1983 issue of *The Micro User* very useful and effective.

However, not being familiar with the use of assembly language or opening and closing files, I cannot use the device as I would like. Can you help please?

I have used some machine code programs, in particular Psion's VuCalc, and this prevents use of the dual cassette system, presumably because the patch is overwritten. Where could the patch be relocated and how?

I would like to be able to read files, search for particular sets of information, alter if necessary and then either print out or save again using a database.

How can I alter the database program to do this?

My understanding is that tape based databases read ALL of the data in, then allow editing before printing or saving ALL of the data again. – *E.A. Terwaite, Gateshead.*

● To move the machine code patch for the dual cassette board, change line 80 to the required address.

Without knowing what memory locations are used by the commercial software it is impossible to say what value to try.

However experiment with some values. You might like to try &C00, &00, &100 or &800.

Your understanding of conventional tape database programs is correct, but with a dual tape system you can have two files open at the same time, one for input and one for output.

This means you can read a section into the computer, process it and write it again before getting the next section.

This is like transferring the water in two 60 gallon tanks with a bucket. The computer is the bucket, only holding a portion of the water at any time.

Bar code software

ARE you planning to publish all the major software printed in *The Micro User* on Micronet?

If not, why not publish the programs in bar code format, with another program so that those of us with light pens can convert them to read bar codes. This would save much tedious keying in. – *P. Watkins-Field, Prestel Mailbox 919991169.*

● You cannot convert the light pen into a bar code reader as this would need a light source and an accurate means of alignment, possibly involving fibre optics. It would be more economical to start from scratch.

As to bar code listings, these would take up far more space than a normal listing, thus reducing the number of programs printed in each issue.

Also the page would be of little use to a reader who was not seated by his computer. A full listing is often easier to study than just looking at a small portion on the screen.

Anyway if you don't like typing them in then *The Micro User* cassette is a cheap alternative.

We have thought about your proposal but have come to the conclusion that attractive as it superficially sounds, it would not be worthwhile.

Nasty video colour

I AM making animated displays to be included in a video film teaching aspects of mental handicap and need a reasonable means of getting my computer output onto video tape with colour.

I was delighted when I read your reply in the August issue of *The Micro User* entitled "Colour Clue", explaining how to make the black and white video output colour.

However inserting the capacitor wasn't as easy as it sounded. Is this something you've actually done yourself, or just looked at on a wiring diagram?

The end of resistor R123 which one needs to solder to is buried in the computer circuit board and the legs of capacitor Q9 are very hard to reach.

On examining the circuit diagram issued with the Advanced User Guide, connecting the exposed loop of R133 to the emitter of Q7 seems to be the same, and I was actually able to do this.

You've got a problem with your micro and you just can't sort it out on your own? Then write to MIKE COOK. If he can't help then probably no one can . .

The capacitor used is a 56. Not Picofarad, it had something like MSI% 56 written on it. The actual maker's mark got rubbed off while putting it in, but it is definitely a 56. I did try a 47 Picofarad as these were the options I had locally.

Now to my current problem. Although with this attention I can now get colour on my video output it is weak, although the picture is crisp.

If I turn the colour knob on my TV up the stripey effect on the edge of the picture increases to an unacceptable level.

Have I made the connections correctly? Is my present capacitor OK?

Thirdly, is there any way I can get good enough colour on the video output to make use of on film? – *John W. Drake-Law, Newton Abbot, Devon.*

● Try using a larger value capacitor, Acorn recommend a 400pF. The value is not critical, but as you have discovered the PAL encoded signal is not very good.

To incorporate the BBC Micro with video signals you will have to lock the two sources of video together. This is tricky and expensive.

However if you want further details of the units available to do this contact Colin Malone at BBC Enterprises, Langham Place, London.

Chip shops run dry

WHAT's happening to Mr Chippy? Has there been a famine? Have the chips dried up?

We are requesting help out of desperation. Having upgraded our BBC Micro, we are unable

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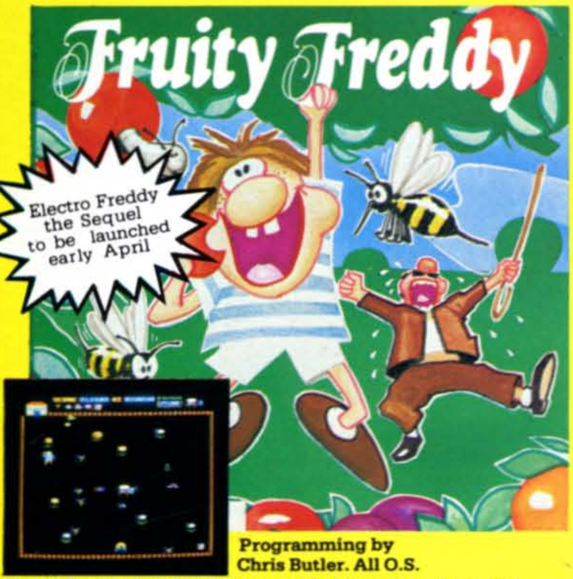
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Electro Freddy the Sequel to be launched early April

Programming by
Chris Butler. All O.S.

Young Freddy has decided to raid Mr. Meano's back garden, collecting the growing fruit before they run to seed. Tread on the fruit before they're ripe and Mr. Meano will be after you. Avoid the pesky bees or kill them with the can of DDT. Look out for the Crazy Crimson Catapillar and the sparrow with its deadly droppings, but grab the sweets, drinks and other goodies. Can you make Freddy's perilous task fruitful? Smooth multi-coloured graphics and all arcade standard features make this a most enjoyable machine code game.

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Programming by
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All the fun and thrills of the funfair are brought to life in your BBC Computer as you fire at the targets that can fly down and eat your limited supply of bullets. Hit the bell with the slider to prevent more targets appearing. Amusing graphics and realistic sound effects make this another 100% machine code winner from Softspot.

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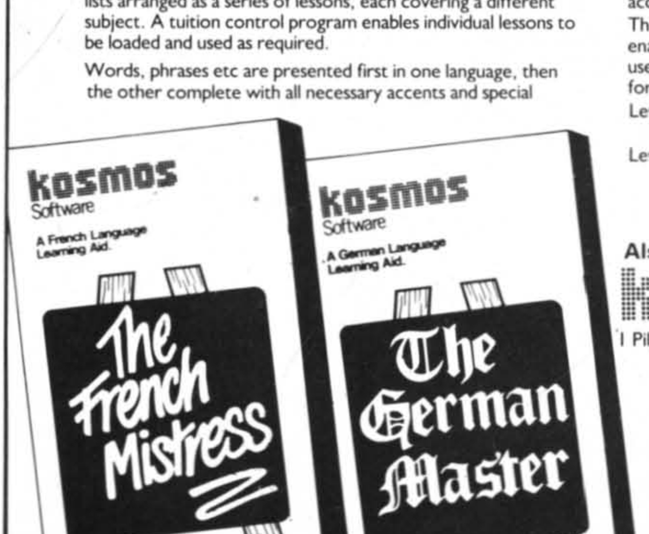

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From Page 111

to obtain the 88LS120, essential for the RS423 interface.

We are currently sharing the only available chip with a friend who has an older BBC Micro as the new models have the chip soldered in.

There is every possibility of the legs weakening or even fracturing – the chip that is, not our friend.

Any advice relating to the availability or alternative appreciated. – *Brian Harding, Prestel Mailbox 068952023.*

● **Yes, there is a worldwide shortage of chips. Even Acorn is feeling the pinch and is bringing back the Model A to make its supplies of memory devices go further.**

We have also heard that the chip you are after is in very short supply. All we can suggest is that you keep ringing up IC stockists until you find one who has taken a delivery.

If it is any consolation, in the past a chip shortage has always been followed by a price drop when they become available again. However, according to our sources this is the worst chip shortage ever. Sorry – just keep plugging away.

Stop your motor fast

REFERENCE Mike Cook's article about the Block? message when reading a program from cassette in the September 1983 issue of *The Micro User*, and the Micromail letter in the following issue.

Can you suggest any modification that can be done to my cassette recorder, a Ferguson model 3T07 with remote motor control, to stop the motor quicker? – *R. Eastland, Portsmouth.*

● **The cassette recorder probably contains a smoothing capacitor which is keeping the motor running after the remote control has been switched off. You could try disconnecting this.**

A better solution would be to arrange for the remote control to not only turn off the power to the motor but also to short out its windings.

In this way any inertial energy would be converted back into electricity and be used to drive the motor in the opposite direction.

The net result of this is that it would act as a power assisted brake. This is a similar system to that used in electric trains.

If you are not sure how to make the modifications it is best to stick to the software patch.

Which wire goes where?

I received your Body Building Packs 1, 2 and 6 and would be grateful if you could answer the following queries:

1. The diagram in the October issue of *The Micro User* shows the red/black/screen connections at the D-plug and the locations of pins 1, 2 and 3 on the light sensor, but gives no hints as to which wire goes to which number pin. Any clues?

2. On assembling the user port bit and inserting it, the LED does not light and the +5v pin is at +1v. Any thoughts? – *F.A. Richey, Salisbury, Wiltshire.*

● **The pins on the light sensor number from top to bottom 1,2,3. Your problem with the user port sounds like the cable being wrong. Check this carefully.**

Buzz off

I have bought every issue of your excellent magazine, and have found the Micromail section particularly helpful, so perhaps you can now help me.

I have an annoying buzz coming from my BBC Micro. How can I stop it?

How can I get more than 32k on my micro, and what is the 1MHz bus for? – *C.D. Arthurs, Prestel Mailbox 494713773.*

● **If you have an issue two or three board, the buzz can be reduced by fitting a 10k resistor from the analogue input pin on the 1MHz port to earth. It can be soldered on the underside of the printed circuit board if you take it out.**

On issue four boards and later this should have already been done, in which case you can turn down the volume by using the preset volume control at the bottom left hand corner of the board.

To get more than 32k, buy an Aries board from Cambridge Consultants. The 1MHz bus is to allow extra input/output devices and paged memory to be attached to the computer.

Extra memory added in this way cannot be used for storing basic programs but can be used for storing data, but you have to write the routines to handle this.

Interlacing troubles

In the March and April 1983 issues of *The Micro User* there appeared articles on monitors. The March article included a statement that interlacing should be turned off when a monitor is used and referred to the User Guide.

Page 435 of the User Guide includes OBSBYTE call with A=&90 and the note on this refers to interlaced displays. I cannot understand how you turn off the interlacing.

As I now have a monitor would you please be good enough to explain in simple terms how this should be done. – *F.H. Molyneux, Cleethorpes.*

● **Interlacing cannot be turned off in Mode 7. If the phosphors on the TV tube are of short persistance, interlacing can cause an annoying flicker.**

To turn it off, type *TV 0,1, then type Mode 0 (or any other mode apart from Mode 7). However I doubt that you will notice the difference.

Atom plus Model B?

I own a BBC Model B with View, disc drives and an FX-80 printer. Like many BBC owners I still possess my Acorn Atom.

In my case it is fully expanded with word processor, etc, and 70k of RAM, being fitted with the DUO system of two paged 32k RAM plus 6k video RAM.

Is it possible to link the Atom to the BBC Micro to supplement the BBC's pathetic memory with the Atom's massive memory, as a second 6502 processor?

Or is it possible to link them, via Econet say, to enable the Atom to make use of the BBC's disc drive?

The Atom has never been provided with a disc drive interface. All Acorn ever provided was an extremely extortionist complete package of interface plus drive. It is gathering dust for lack of discs.

I believe Econet was first produced for use with the Atom. There must be many readers in my situation since the natural action was to upgrade from the Atom to the BBC when the former became obsolete. – *D. Rogerson, Upminster, Essex.*

● **Unfortunately the Atom is not designed to be used as a second processor. In theory it is possible to do this but you will end up using the Atom's Basic via your BBC keyboard.**

In practice the information required to use the Tube is not being released by Acorn so you are faced with a voyage of discovery trying to unravel its mysteries.

If you have the knowledge to do that we think your efforts would be better suited elsewhere, like writing for *The Micro User!* You will make a lot more money than you will save by linking these two.

No Apple disc link

I have a BBC Model B fitted with disc drive interface and have easy and extended access to an Apple disc drive (Disc II with DOS 3.3).

I understand that the two cannot be directly connected, and that some further interface will have to be obtained or constructed.

I would be grateful for any assistance you could give in this matter. – *Walter F.F. Curtis, Norwich.*

● **Sorry, but they are really not compatible. You could design an interface if you had the time and the skill but it would end up costing you more than buying two disc drives.**

TECHNICAL queries for answering on this page should be sent to Mike Cook, *The Micro User*, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Letters on other subjects should be sent, as usual, to Micromail, which this month starts on Page 175.

More sound advice from NIGEL PETERS

Use an ENVELOPE to make your SOUNDs more scintillating

THE Editor staggered up behind me. "ENVELOPE, eh? About time you got to that. Makes it a red letter day, doesn't it? Frankly I'd get on with it, post haste".

He veered into his office and managed to slam the door, leaving me waiting for the obvious and awful ENVELOPE pun still remaining.

SO far in this series of articles all we've done is explore the SOUND command, its intricacies and vagaries.

We have managed to produce some interesting sounds on the way and, I hope, had a lot of fun in the process.

However we haven't explored all of the BBC Micro's sound capabilities. We've yet to use the ENVELOPE command.

Now this is a formidable looking beast, being followed as it is by 14 numbers or parameters. The numbers and what they do are shown in Table I, but don't let them put you off.

As long as you keep your nerve and take things step by step you won't come to any harm.

Why have an ENVELOPE in the first place, you might ask. After all, we've been doing quite well with the nice, comparatively simple SOUND command. Why complicate matters?

The answer is that although we can do a lot with SOUND, the ENVELOPE command allows us to do a whole lot more!

The note that we get from the BBC Micro with the SOUND command tends to be rather "electric" and not very exciting.

Try:

```
SOUND 1,-15,100,200
```

Well, it's a sound, but not a very interesting one. Now let's vary this sound using an ENVELOPE command to define an envelope. Type in:

```
ENVELOPE 1,1,70,16,0,0,
0,0,126,0,0,-126,126,126
```

then:

```
SOUND 1,1,100,200
```

and notice the difference.

The SOUND command is exactly the same as the previous one except that the loudness parameter of –15 has become a 1. This figure 1 just tells the micro to look for an envelope which has been typed in as envelope 1.

I must point out that the envelope must have been defined before the SOUND command can use it. The micro then obeys the SOUND command, but the note that it plays is influenced by the ENVELOPE command we defined previously.

In this case, the rather boring noise we produced earlier has now become the sound of an alarm clock. I don't want anyone dozing off while they're reading my article!

One thing to notice is that it is the SOUND command that makes the noise.

You can type in ENVELOPEs until you're blue in the face but they won't make a noise. All they do is alter the noises made by any SOUND command that refers to them.

The envelope defined by an ENVELOPE command varies the sound produced by a SOUND command (provided the SOUND command refers to the envelope by the number in its loudness parameter).

Now let's have a look at the parameters that follow the ENVELOPE command:

```
ENVELOPE N,T,PI1,PI2,PI3,PN1,
PN2,PN3,AA,AD,AS,AR,ALA,ALD
```

The beast still looks pretty formidable, but we'll go through it step by step. I have used the same parameter names as you'll find in the User Guide and

Parameter	Range	
N	1 to 4	Envelope label
T	0 to 127	Length of each step in 100th of seconds.
	(+ 128)	Added to stop auto-repeat
PI1	–128 to 127	How the pitch will change with each step in the first part
PI2	–128 to 127	Pitch change per step in the second part
PI3	–128 to 127	Pitch change per step in the third part
PN1	0 to 255	The duration of section one, measured in steps of T
PN2	0 to 255	The duration of the second section in steps of T centiseconds length
PN3	0 to 255	The duration of the third section PN3 steps, each of T centiseconds
AA	126	These values affect the loudness of the note and are fixed for this article
AD	0	
AS	0	
AR	–126	
ALA	126	
ALD	126	

Table I: Values and meaning of the ENVELOPE parameters

some of the books, so you can cross reference.

You'll be pleased to know that we're ignoring the last six parameters, the ones that begin with A. These affect the loudness, or amplitude, of a note and we'll cover them in the next article.

So we're left with the first eight parameters. These label the envelope, decide how long its effects are going to last and vary the pitch of the note.

Now why would you want to vary the pitch of a note? It seems odd that you should specify the pitch in a SOUND command and then use an envelope to vary it.

The reason is that in real life notes are never the pure, steady sound that we get from the BBC Micro's sound channels.

What we call the pitch of a note is just an average. The actual note "wobbles" around that value. It's this wobbling that lets us tell the difference between the middle C on a piano and the middle C on a violin.

The average pitch is the same, but the wobbles vary. (I beg the forgiveness of any musical genius who may read the above.)

The ENVELOPE command allows us to approximate these wobbles and so make the noises our micro produces sound like a saxophone or an alarm clock. I should point out that the loudness also wobbles, but we'll leave that until later.

Now let's take a look at the first parameter following the ENVELOPE command. As you'll see from Table I, this is called N and can have values of 1 to 4.

N is a reference number. You decide what number you want to refer to the envelope by and put that number in N. Then when you want a sound to be influenced by that envelope you just put that number in the loudness parameter of that SOUND command.

If you look at the alarm clock again you'll see that we made the N in the envelope equal to 1 and put a 1 in the loudness parameter of the following sound statement. We could have used 2 as the label, or 3, or 4.

From this you'll see that you can have up to four envelopes ready for use.

The next parameter we come to is T which, as you might guess, stands for time. As you'll see in a moment, the ENVELOPE command works in a basic unit called a step. It will affect a SOUND command in one way for a specified number of steps, then in another way for another number of steps and so on.

What T does is to allow you to choose how long each of these steps will be. It can have values from 0 to 127, and is measured in hundredths of a second.

If we have T equal to 100 then each step is a hundred centi-seconds long, which, if my maths is correct, makes each step last a second.

Looking at the alarm clock envelope again, you'll see that T is equal to 1, so each step lasts for just one hundredth of a second.

So N just labels the envelope while T decides how long each of its steps will last.

Now let's explore the next six parameters which cause the wobbles in the pitch of the note, allowing it to make all manner of amazing sounds.

There are three stages or sections to the wobble, or change, in pitch. The pitch of the note can go up, go down, or stay the same in each section.

Figure I shows the effect of a hypothetical envelope on a hypothetical sound. The horizontal line is the pitch of the note as defined in the SOUND command. The wavy line shows the notes actually played under the influence of the ENVELOPE command.

As you can see, there are three stages. The pitch rises in the first stage, goes down in the second, and rises again in the third. Of course it could have risen in all three stages, or gone down in all three, but let's just stick to it going up, down, and up again.

These ups and downs are caused by the parameters PI1, PI2 and PI3 in the ENVELOPE command. PI1 is the increase or decrease of pitch for each step in stage one. Similarly PI2 sets the increase or decrease per step for stage two and PI3 that for stage three.

The units of pitch are the same as we used in the SOUND command. Eight of them make up a range of one tone, four of them a semitone.

The length of each stage is determined by PN1, PN2, and PN3.

The value of PN1 determines that the first stage will consist of PN1 steps, each of length T. Similarly the second stage is of length PN2 steps, again of length T.

As you might guess, the third stage is of length PN3 steps, each step lasting for T seconds.

Figure II shows all this. It's just another version of Figure I with the

➡

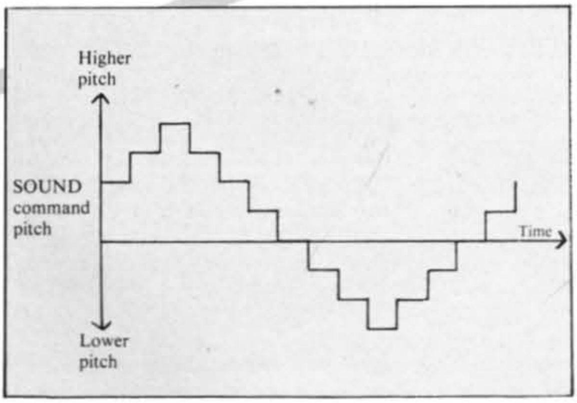

Figure I: Effect of ENVELOPE on SOUND

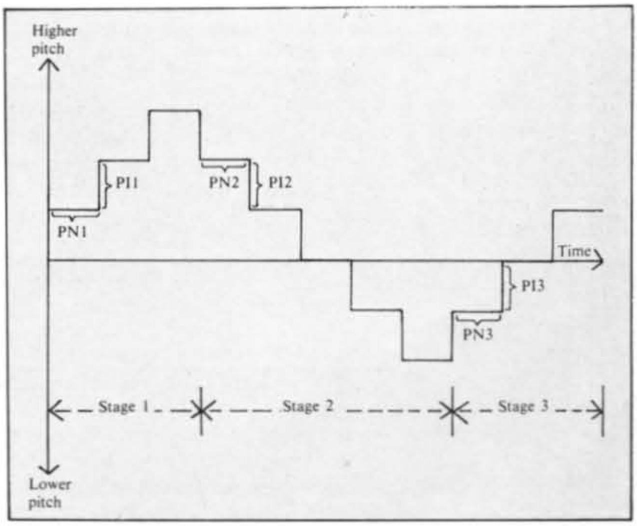

Figure II: ENVELOPE parameters

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parameters put in.

Let's have a look at this in practice. Type in and run Program I.

```
10 REM PROGRAM I
20 ENVELOPE 1,100,4,0,0,10,0,0,
   126,0,0,-126,126,126
30 SOUND 1,1,50,200
```

Exciting, isn't it? Can you understand the ENVELOPE command of line 20 and how it affects the noise made by the SOUND command of line 30?

Looking at line 20 we first of all have the ENVELOPE keyword, then comes the number 1. This is the label that the envelope will be known by. Then comes 100, which means that each step of the envelope will take 100 centi-seconds or one second.

As we can see, PI1 has the value of 4. This means that for each step of one second the note produced by the SOUND command will rise in pitch by one semitone.

Looking at the value for PN1 we see that there will be 10 steps. Each will last for one second and every second the note will rise by a semitone. Run it again and see that this is the case.

You'll notice that we've made the parameters of the other two stages equal to zero to stop things getting too complicated. The last six parameters effect the amplitude of the note. We'll deal with this in the next article, and for the moment just stick to the six values in line 20.

You might also notice that the envelope lasts for 10 seconds (PN1 times T) and the SOUND command lasts for 10 seconds. What happens if they don't coincide so neatly? Try Program II and see.

```
10 REM PROGRAM II
20 ENVELOPE 1,100,4,0,0,11,0,0,
126,0,0,-126,126,126
30 SOUND 1,1,50,200
```

In this program you'll see that PN1 has become 11 so we should expect the envelope to last for 11 seconds. However as the note is only being played by the SOUND statement for 10 seconds, the last step never gets taken.

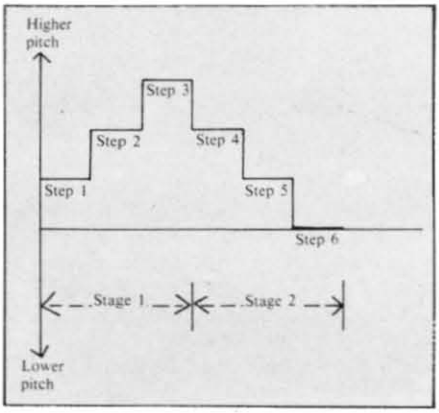

Figure III: The ups and downs of ENVELOPE

The reverse is the case in Program III.

```
10 REM PROGRAM III
20 ENVELOPE 1,100,4,0,0,5,0,0,
126,0,0,-126,126,126
30 SOUND 1,1,50,200
```

As you can see, PN1 has now become 5. The SOUND statement is the same, so the note will play for 10 seconds, but the envelope will only last for five seconds (five steps, each of one second).

What happens during the last five seconds? As you can hear, the envelope auto-repeats. That is, when it comes to the end of its steps, it pauses for a couple of steps (one for each of the other two stages), then starts again and continues until the SOUND statement runs out of puff after 10 seconds.

This auto-repeat can be very useful for producing sound effects, but it can also be a nuisance. Happily, it can be switched off by adding 128 to whatever value of T you have put in the ENVELOPE command.

In Program IV to switch off the auto-repeat I've added 128 to the value of T, previously 100. This makes for a T value of 228. Each step is still one second long, the extra value justs ensures no auto-repeat.

Have a go at Program IV and see what I mean.

```
10 REM PROGRAM IV
20 ENVELOPE 1,228,4,0,0,6,0,0,
126,0,0,-126,126,126
30 SOUND 1,1,50,200
```

The auto-repeat has been switched off so the sound increases for six steps then stays at that pitch for the remaining four seconds of the note.

Right, let's see about doing something with the second stage of the pitch envelope. Let's give PI2 (pitch increment two) a value of –4 and PN2 a value of 5.

Run Program V and see what happens.

```
10 REM PROGRAM V
20 ENVELOPE 1,228,4,-4,0,5,5,0,
126,0,0,-126,126,126
30 SOUND 1,1,50,200
```

As you might have guessed, the whole thing lasts for 10 seconds (PN1+PN2 steps, each of one second duration). The pitch of the note goes up one semitone for each of five steps, then it goes down one semitone for five steps.

Program VI gives values to PI3 and PN3 and so we make use of the third stage of the pitch part of the envelope.

```
10 REM PROGRAM VI
20 ENVELOPE 1,228,4,-4,4,3,3,3,
126,0,0,-126,126,126
30 SOUND 1,1,50,200
```

As you may have realised, the envelope lasts for nine seconds while the sound lasts ten. This creates an uneven effect, the last note lasting two seconds.

Program VII shortens the note played by the SOUND statement to compensate for this.

```
10 REM PROGRAM VII
20 ENVELOPE 1,228,4,-4,4,3,3,3,
126,0,0,-126,126,126
30 SOUND 1,1,50,180
```

You can figure out how long the envelope lasts by adding up PN1, PN2, and PN3 and multiplying the result by T. That is, you add up the total number of steps and multiply them by the time each step takes.

And that's really all there is to the pitch part of the ENVELOPE command. It's just a matter of deciding how many steps you want in each stage and what happens to the note for each step.

It's quite simple really. Practise using envelopes and they'll soon stop seeming so difficult.

One thing that you should be wary of though, is shown by Program VIII:

```
10 REM PROGRAM VIII
20 ENVELOPE 1,255,4,-4,0,3,3,0,
126,0,0,-126,126,126
30 SOUND 1,1,50,255
```

You might think that as you start by going up three steps and then go down three steps you'll start and end on the same note.

However this isn't the case – the sound ends up one semitone below the beginning pitch. Figure III shows what's happened.

The ENVELOPE takes effect straight away and the first note played is a semitone above the pitch of the note in the SOUND statement. It then goes up two more semitones and drops three. The final note is, as you can hear, a semitone below the first.

Program IX rectifies this by having one step less in stage two than in stage one. The final note is now the same pitch as the first.

```
10 REM PROGRAM IX
20 ENVELOPE 1,255,4,-4,0,3,2,0,
126,0,0,-126,126,126
30 SOUND 1,1,50,255
```

And that's the end of our first excursion into the ENVELOPE command. It's not all that hard when you get used to it, and you can do amazing things with sound envelopes.

Try Program X and listen to the four different sounds produced. If you look at the listing you'll see that the SOUND command is the same in each case, only the envelope differs.

And that's it. After waiting all day the Editor finally came out with the long expected pun. He staggered up behind me and asked: "Have you got ENVELOPE licked yet?"

I stamped out.

```
   10 REM PROGRAM X
   20 count=0
   30 ENVELOPE 1,255,4,-4,4,3,3,3,
   126,0,0,-126,126,126
   40 ENVELOPE 2,127,4,-4,4,3,3,3,
   126,0,0,-126,126,126
   50 ENVELOPE 3,20,4,-4,4,3,3,3,
   126,0,0,-126,126,126
   60 ENVELOPE 4,1,4,-4,4,3,3,3,
   126,0,0,-126,126,126
   70 REPEAT
   80 envelope =1 + count MOD4
   90 PRINT:PRINT
   100 PRINT "Envelope number ";
envelope
   110 PRINT:PRINT
   120 PRINT"Press key for next
envelope."
   130 SOUND 1,envelope,50,255
   140 count=count+1
   150 WAIT$=GET$
   160 SOUND &11,0,0,2
   170 UNTIL FALSE
```

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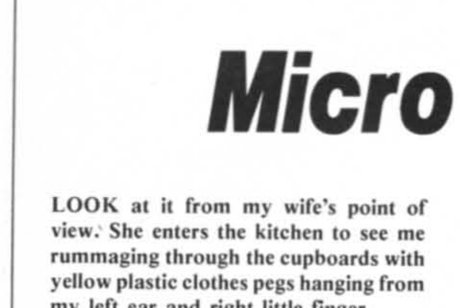
So you think you could run a mile and not end up panting like marathon man?

Make sure you're fit –with this BBC Micro pulse monitor

LOOK at it from my wife's point of view. She enters the kitchen to see me rummaging through the cupboards with yellow plastic clothes pegs hanging from my left ear and right little finger.

What is she supposed to think? "I know this might look odd", I say. "Oh, no", she says smiling nervously and backing away, "I am sure they will let you wear what you want when they have taken you away".

It took quite a lot of fast talking to explain that I was merely trying out part of this month's Body Building exercise.



If the thought of making up this month's Body Building kit sends your pulse rate soaring

Relax!

You can get a fully assembled version by nothing more exhausting than filling in the coupon on Page 122.

Then test your fitness by measuring your heart beat after some exercise – the quicker it returns to normal the better.

And you'll find lots more applications for this clever device.

This is really for the experimenters – a pulse measuring system. It allows the micro to monitor your pulse rate and give an indication of blood flow.

To do this there is no need to make any electrical connection with the skin as we can utilise a property of the blood.

Normally your fingers are not transparent, but if you shine a strong light through them you can see a dull red light. The more blood there is, the stronger the colour.

As blood is pumped along, the amount in any one part of the body varies with the pulse rate.

This is the principle of operation of this month's exercise, only instead of using visible light we shall use infra red.

It turns out that the skin will let in infra red light more easily than the visible variety, and also efficient infra red detectors and emitters are freely available at reasonable cost.

So the object is to illuminate the hand with infra red light and measure how much gets through.

We can do this in two ways, either by transmission or by reflection. Using the transmission method the detector and the emitter are placed on opposite sides of the finger.

This is where the plastic clothes peg comes in. First I bent the spring so it was not too painful when clamped on. Then I drilled a hole on one side and pushed the dome part of the LED through.

It was fixed in place using epoxy adhesive to flood the convenient recess on the back of the peg. I removed the other side of the peg using a sharp knife and inlaid the detector, again fixing with epoxy.

Finally I painted the set epoxy black to help prevent ambient light interference. The basic idea can be gleaned from Figure I.

If you prefer, you can use reflection. To do this the detector and emitter are placed side by side in a suitable holder and the finger is placed on top of them. See Figure II.

Whichever method you use, if there is artificial light about it is likely to cause interference.

This is because a light bulb is fed with alternating current, which causes its light output to vary at the same frequency.

We do not normally notice this as the variation is too rapid for our eyes to cope with. However the sensitive detector we are using is capable of picking it up, with the result that a 50Hz signal will be superimposed over the required signal.

By MIKE COOK

To prevent this we must shield the sensor. This can be done by wrapping some black cloth around the peg and fastening it up with a small piece of Velcro.

In fact you might like to construct the detector and emitter in a band of thick cloth that you just wrap around your finger.

By using silicon rubber compound you can easily make a comfortable unit. Silicon rubber is often sold in tubes for sealing baths and it comes in a variety of colours, but you should choose black to

THE BEEB BODY BUILDING COURSE

PART 14

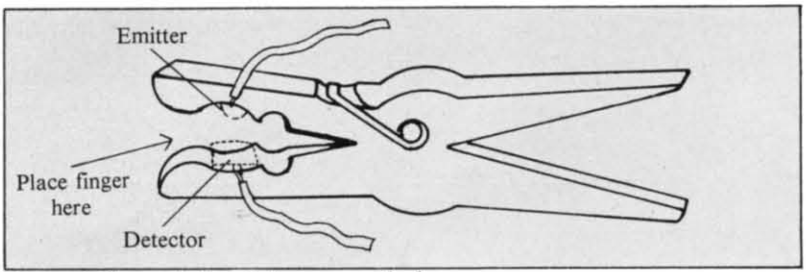


Figure I: Transmission clothes peg method

cut out stray light.

Alternatively if you are using the reflection method you can construct a cover. In any event this is only necessary if you operate the detector near artificial light.

My method of coping with this when developing the prototype was to stick it up my jumper – but that's another story!

So how does the detector respond to light? To understand this we need to look at a little semiconductor physics, but that is not as frightening as it sounds.

The detector is really a PIN diode, and this diode is made up of three different types of semiconductor material.

The first is known as P-type as it conducts electricity with positive charge carriers. These are known as "holes", which in reality means the absence of an electron.

The second type of semiconductor is known as N-type as it conducts electricity with negative charge carriers or electrons.

The third is Intrinsic semiconductor material which has no charge carriers in it and will not normally conduct electricity.

Thus a PIN diode (P-type, Intrinsic, N-type) is composed of a layer of each type of semiconductor.

Figure III shows a cross section through the diode which is reverse-biased, in that no current is flowing through it and an electrical charge is across it.

Now if a photon of light (a photon is just a small package) enters the Intrinsic region of the diode it could collide with the atoms and bash them about so much that an electron would be dislodged.

This would in effect create an electron hole pair. This pair would not recombine as the charge across the diode sweeps them into the appropriate side.

Remember that like charges repel and unlike charges attract. This has the effect of generating a small amount of electricity every time some light enters the Intrinsic region.

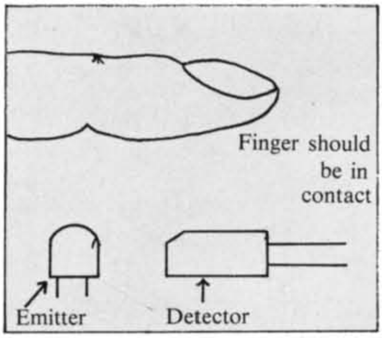


Figure II: The reflection method

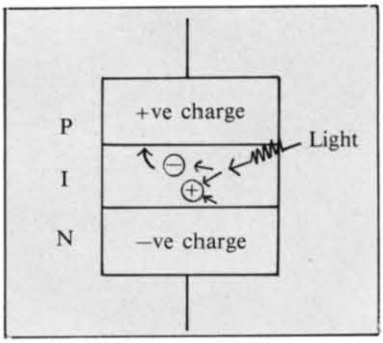


Figure III: Electron/hole production in a PIN diode

The amount of electricity is so small that it has to be amplified. In this project we are not interested in the amount of light entering the detector, only in the changes in that light, as these correspond to the pulse.

Therefore the signal is AC coupled into the amplifier. Figure IV *(on next page)* shows the full circuit diagram, which consists of a high gain differential amplifier and a threshold detector.

A differential amplifier will only amplify the difference between two inputs. As the detector is a long way off at the end of the wire it can pick up mains signals, or hum.

However as each wire picks up the same amount of interference, this will be a common signal.

We only want to amplify the difference between these two wires, which will be our pulse. So each wire from the detector is fed into a non-inverting amplifier A1 and A2 (see *The Micro User* December 1983 for a full explanation of how that works).

If the signal in each amplifier is the same then the gain will be one, because there will be no reduction in the amount of signal fed back to the negative input. We say it acts as a voltage follower.

However if the signals are different only a fraction will get back to the negative input, and so the amplifier will have some gain.

Therefore the first two amplifiers produce a gain of one for common signals and a high gain for difference signals. This gain can be adjusted by VR1.

The two signals are fed into a third amplifier, A3, which in essence is an inverting differential amplifier.

In theory this will only pass difference signals and reject all common ones. In practice there is some leakage of common signals due to the internal design of the amplifier and the tolerance of the components.

To see how this works we first have to consider the workings of an inverting amplifier. Figure V shows one. Its great advantage is that it is easy to calculate its gain.

If, say, one volt positive is applied to the input then as it is the negative input, the output will start to go negative.

As the other input is tied to earth, the output will go negative to such an extent that the potential divider action of the two resistors produces the same voltage on the negative input.

So the input voltage pulls up the input to the amplifier and the output goes low enough to balance this out.

The gain is simply the ratio of the two resistors RA/RB so if we chose 10k and 1k resistors respectively we would have a gain of 10.

Coming back to Figure IV this balancing act is performed not about earth but about the point of the common

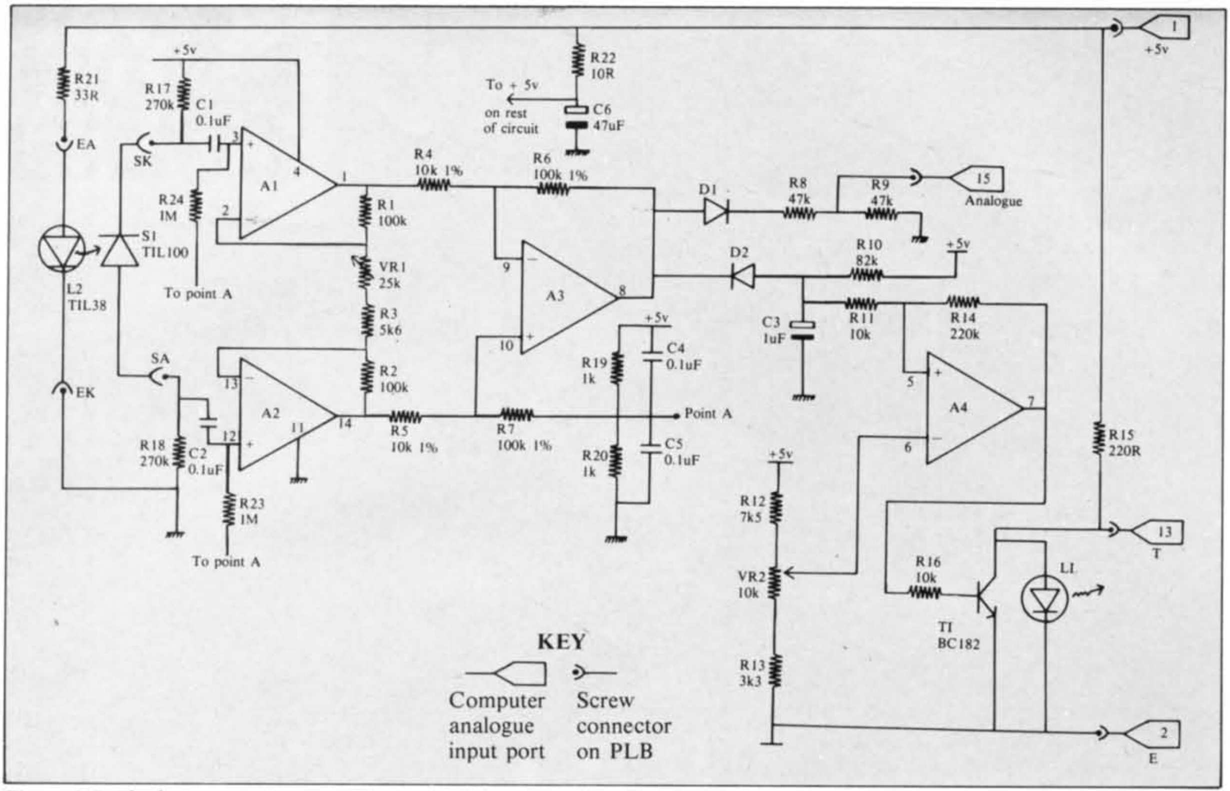

R21 33R
+5v
R17 270k
C1 0.1uF
EA
SK
R24 1M
A1
R1 100k
VR1 25k
R3 5k6
R2 100k
S1 TIL100
L2 TIL38
To point A
SA
EK
A2
R18 270k
C2 0.1uF
R23 1M
To point A
R22 10R
To + 5v on rest of circuit
C6 47uF
R4 10k 1%
R6 100k 1%
A3
R5 10k 1%
R7 100k 1%
R19 1k
R20 1k
C4 0.1uF
C5 0.1uF
Point A
D1
D2
R8 47k
R9 47k
15
Analogue
R10 82k
C3 1uF
R11 10k
R14 220k
A4
R12 7k5
VR2 10k
R13 3k3
R16 10k
T1 BC182
L1
R15 220R
1
+5v
13
T
2
E
KEY
Computer analogue input port
Screw connector on PLB

Figure IV: The heart rate monitor

From Page 119

signal. So the output of this amplifier can be fed through to the analogue input port at the back of the micro.

The diode D1 removes half a volt from the signal and R8 and R9 make it suitable for feeding into the computer.

As this is an inverting amplifier the signal is upside down, which has to be compensated for in the software.

This arrangement alone would allow us to plot a profile of our pulse, but the pulse rate is an important measurement and, as we have an amplifier over – there are four in a package – we can also build a threshold detector.

This is connected to the computer via the fire button input on the analogue input port. The amplifier A4 is connected as a comparator with hysteresis (see the March 1984 article for an explanation of hysteresis).

The output from the pulse amplifier is taken through a diode to prevent any feedback affecting the pulse's shape.

It is then smoothed by capacitor C3 to remove any signals from artificial light sources. In the absence of any signal this capacitor will charge up through R10.

However when a negative pulse is produced the voltage on this capacitor drops. This voltage is taken through R11 to the input of A4.

When this voltage is above that at the negative input, the output will go high. This will feed back a little more voltage to the input via R14 which means the voltage will have to drop further than the switch-on threshold point in order to reach the switch-off threshold point.

This is known as hysteresis. The size of the hysteresis is governed by the ratio of R14 and R11.

As the size of the pulse may vary, VR2 allows the threshold point to be adjusted to suit.

The output of the amplifier then feeds into a transistor which connects directly to the computer's fire buttons. Across the transistor is an LED to indicate when a pulse is received.

When the transistor is off the LED lights up. However when the transistor is on the current is diverted away from the LED and so it is not lit. This is

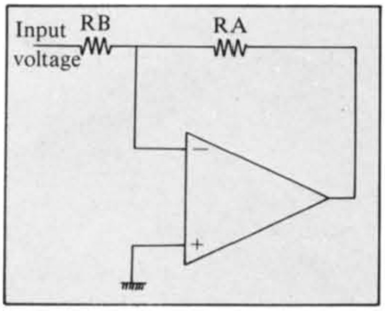

Input voltage
RB
RA
−
+

Figure V: An inverting amplifier

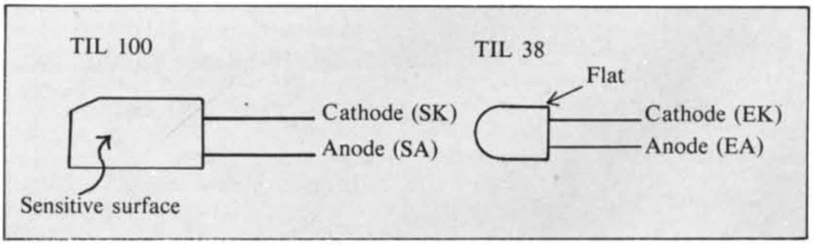

TIL 100
Cathode (SK)
Anode (SA)
Sensitive surface
TIL 38
Flat
Cathode (EK)
Anode (EA)

Figure VI: The infra red components

known as shunting the current.

It is not very usual to do this, but in this case it ensures a constant current is drawn from the supply. It is diverted through the transistor or the LED, but it remains constant.

If the LED were in the collector circuit, as it was in my initial circuit, the switching on and off would feed through pulse interference to the other amplifiers and so distort the signal.

Finally the infra red emitter needs to be driven with about 100mA as 150mA is the absolute maximum for this device. As the supply is five volts, this means the resistor needs to be 33 ohms.

A quick calculation will reveal that a 33 ohm resistor with 100mA flowing through it will consume 0.33 watts.

This resistor has to be capable of taking this, and therefore must have a rating of at least half a watt. Even so it runs rather hot to the touch.

The circuit has been laid out on a printed circuit board and is available with all the parts, except the clothes peg, in Body Build Pack No 11.

It connects to the analogue input port through a small length of four way cable.

I decided to use this way of connecting to the computer rather than the printed circuit mounted plug used in the Sound Show board *(December 1983 Micro User)* to allow several heart rate circuits to be monitored if required.

The printed circuit board has the components printed on and so, as usual, it is just a matter of locating the components and soldering them in.

The board has provision for mounting the emitter and detector so that the reflective method can be used by directly placing the finger on them. This is the method we've used on the made up version. *(See page 122 for details).*

However, if you are using the clothes peg, do not mount the emitter and detector on the board but connect them via cable and screw connectors.

The infra red detector and emitter are shown in Figure VI. Note they must be connected the correct way round and make sure the sensitive face of the detector ends up next to the skin.

Use some of the four way miniature cable to make a lead to the printed circuit board.

Ensure that the polarity-sensitive components, diode C3 and IC1, are mounted the right way round. The correct position is shown on the circuit board.

```
   10 MODE4
   20 PRINT TAB(0,4);"HEART MONITOR T
EST"
   30 PRINT"Beeb Bodybuilding Course"
   40 PRINT"THE MICRO USER April 1984
"

   50 PRINT"By Mike Cook"
   60 PRINT:PRINT
   70 *FX16,1
   80 REPEAT
   90 T%=0
  100 TIME=0
  110 MOVE 0,A%
  120 FOR X%=0 TO 1279 STEP 4
  130 A%=(ADVAL(1) DIV 64) EOR &3FF
  140 P%=ADVAL(0) AND 1
  150 IF P%=0 AND B% THEN SOUND 1,-10
,150,1:B%=0:T%=T%+1
  160 IF P% THEN B%=1
  170 DRAW X%,A%
  180 FOR D=1 TO 20:NEXT
  190 NEXT
  200 CLS
  210 REPEAT
  220 P%=ADVAL(0) AND 1
  230 UNTIL P%=0 OR TIME > 750
  240 R%=(T%/(TIME/100))*60
  250 PRINT TAB(0,30);T%;" PULSES IN
";TIME/100;" SEC HEART RATE ";R%;"/MI
N"
  260 UNTIL FALSE
```

Listing I: Heart monitor test program

Having constructed the amplifier and sensor and connected it up to the computer, it is time to check it out. A test program is shown in Listing I.

Attach the sensor to your finger. I found I got better results with the dome of the infra red emitter pressing into the pad of my finger and the sensor across where the fingernail starts.

Remember to shield the sensor from artificial light. Run the program and you should see your heartbeat traced across the screen.

You have to be still, otherwise the movement of your hand gives an interfering signal. I found sometimes that the signal was initially not very strong but after about 30 seconds my finger "got used to it" and produced good signals.

You can adjust the amplifier's gain by changing VR1, and when you have a good series of peaks you can adjust VR2 to light the LED on every pulse.

The program is designed to give a short bleep every time the light comes on and makes your computer display look like something out of a hospital movie.

As well as plotting your pulse, the program also calculates your pulse rate per minute.

Generally if this is below 50 then either the circuit is not working properly or you are dead. I am reliably informed that a pulse rate of over 160 also means that you are not long for this world.

In trying this out on various friends, in some cases ex-friends, I was surprised at how difficult it was for the infra red to penetrate some of them.

In all cases they produced a much smaller signal than when I tried it on myself. But then, as my wife says, I always was very transparent.

In such cases you might achieve more success with the reflection method described earlier.

Now like all Body Building projects

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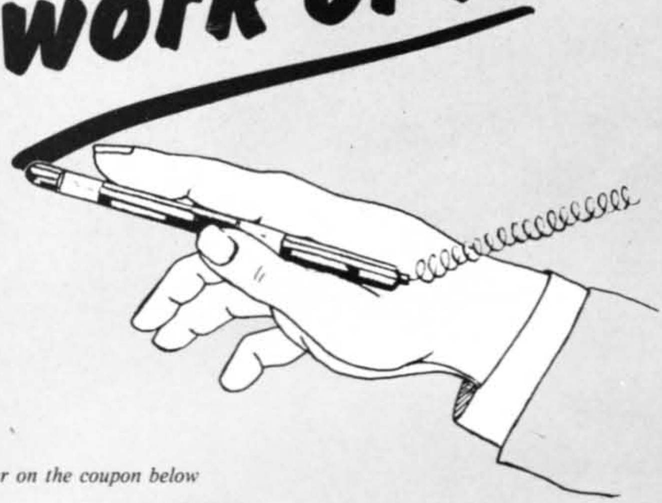

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THE BEEB BODY BUILDING COURSE

From Page 121

the software provided is just a beginning. So here are a few lines of explanation about how it works so that you will be able to modify it for your own purposes.

Line 70 ensures only one channel of the analogue input port is active. This allows sampling to take place at the maximum speed.

Line 130 takes the sample and inverts the number to compensate for the inverting differential amplifier we used.

Lines 150 and 160 make sure that a bleep is produced only on the transition when the light comes on. It also keeps a count of the pulses in that scan.

Line 140 sorts out the state of the fire button.

Line 180 introduces a small delay so that a reasonable number of pulses are shown on the screen. You can alter it if you want to see more of less of them.

Lines 210 to 230 wait until another pulse is produced so the heart rate calculations are always done on a whole number of pulses.

Alternatively, if you have not yet set up the threshold of the trigger, it will automatically initiate another scan after a certain time has elapsed.

As the area under the curve is proportional to blood flow you could keep a running total of all the samples to give a rough idea of how much blood is flowing.

If you do this you can play tricks on yourself by putting the hand *not* connected to the sensors in some cold water.

Your brain thinks all the body is getting colder and so will reduce the blood flow but keep the pulse rate the same. Conversely, if you put it in hot water the blood flow should increase.

If you are really adventurous how about devising the first ever bio-feedback computer game?

When thinking about this I was not sure if the game should be good for you and reduce your heart rate and so be relaxing (or boring). Or whether to go for socially irresponsible software and produce a game that increased your heart rate with excitement.

Whatever you decide, you might consider connecting the threshold signal to one of the control lines on the user port and have the computer generate an interrupt on every heart beat.

This could then use the internal timer to keep a running total of your heart rate in a memory location that the computer would access.

You could even build such a routine into an existing game and produce a compulsory rest if it all gets too exciting.

You can also use it to see how fit you are. The quicker your pulse rate returns to normal after some exercise the better.

I did try this on our editor, but the only time his pulse rate increased was when it was his turn to buy a round. You can't win them all!

See you next month.

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ORBITTING SATELLITE

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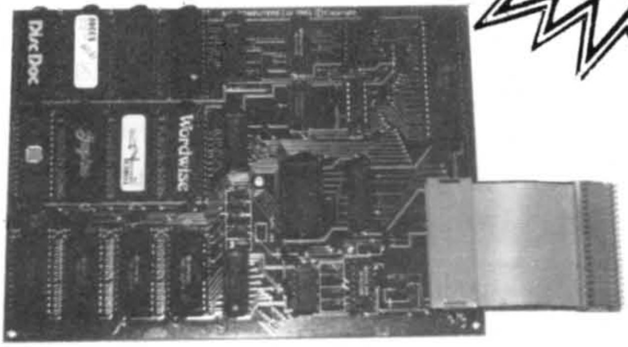

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ASSEMBLER DEBUGGER EDITOR

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IT has taken several weeks to prepare this review of ADE, the Assembler, Debugger and Editor that comes on a chip. Anything less would not have done it justice.

The system comes in a box containing a 160 page manual, the chip, a system utilities and demo disc and instructions on inserting the eprom.

The manual is well written and produced. It has three major sections – one each on the Assembler, the Editor and Spy, the debugger – together with a collection of highly useful appendices and quick reference guides.

It also contains the formatting commands, a reference for the 6502 instruction set, a programming description of the sideways ROM format, an operating system summary giving the *FX/OSBYTE calls, the other OS calls and the vectors and a summary of the VDU codes.

The final appendix describes the software supplied on the system disc.

The system has a command level from which the component programs may be called, although they can be entered with any ROM in control. The first part of the manual describes this command level and the new * commands the chip provides (see Table I).

In command mode the asterisk is supplied for you as the prompt.

The assembler uses the standard mnemonics and forms of addressing – these are the same as the assembler in Basic. But as it doesn't have Basic to do the arithmetic and set up the labels – as Basic variables – there are some differences.

With the built in assembler, the labels can be of any length up to 255 characters, and all the characters will be taken into account. In the ADE assembler, the labels may be of any length – you can imagine why I haven't checked this – but only the first six characters are kept. The first character need not be a period.

Thus two labels with the same first six characters will be taken to be the same. I think this is an unfortunate restriction, but you do get used to it.

Using the built-in assembler, to pass an address to an OS routine through the X and Y registers requires the code:

By BRUCE DIGBY

```
LDX #ADDR MOD 256
LDY #ADDR DIV 256
```

in the ADE assembler it is much simpler:

```
LDX# >ADDR
LDY#<ADDR
```

Also instead of using P% to represent the first byte of the current instruction in an operand you use * instead. Apart from that, unlike the Basic assembler, the arithmetic which can be used in an operand does not allow:

```
LDX #ATN(PI*0.5)
```

instead of:

```
LDX #1
```

but it does allow an unusual number of operators (see Table II). More in fact than many mainframe assemblers, and it seems very unlikely that a programmer will find himself short.

In operands, numbers are taken to be decimal unless they are prefixed with an & or a $, when they are taken to be hexadecimal. As well as this you can use binary numbers by prefixing them with a %, which can save hard-to-trace errors in setting VIA or ACIA registers.

The various fields of an instruction will normally be separated by a TAB character which both the assembler and the editor interpret with the tab stops being spaced at eight column intervals.

As it is only one character, rather than several spaces as in the Basic assembler, a considerable amount of space in the source file can be saved compared to the same file, as neatly formatted, in Basic.

Comments can be started in a number of ways. A * in the column denotes a line which is pure comment and either a semicolon or a backslash can be used to denote a comment field at the end of an instruction line.

Both the semicolon and the backslash can also be used, instead of *, in column 1 to start a comment line, which makes converting Basic programs to ADE

→

*ADE	Selects the ADE chip.
*ASM	Invokes the assembler.
*BRK	Enables breakpoints; when a BREAK code is met by the 6502, the debugger Spy is entered automatically.
*CTRLF	While entering data from the keyboard, CTRL+F will put you into Spy.
*EDIT	Enters the editor.
*FX100	To enter Spy either from a user program or command level.
*HELP ADE	Prints the version number and this list of commands.
*LST	Invokes the Spy disassembler.
*MODE	Changes the screen mode.
*NOBRK	Reverse of the *BRK command.
*NOCTRLF	Reverses the *CTRLF command.
*SPY	Enters the debugger.

*Table I: ADE * commands*

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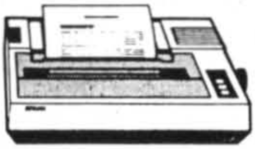

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format much easier.

There are also a set of pseudo-ops to set the origin, create constants and so on.

Basic II allows the use of EQUB, EQUW, EQUD and EQUS to create bytes, 16 bit words, 32 bit words and strings.

This has always seemed a strange choice as traditionally EQU has been used to set a constant value like the address of OSWRCH. In this assembler rather more usual forms have been used (see Table IV).

The pseudo-op DS, though it is intended to reserve space which is initially empty – that is, filled with garbage – will actually be filled with zero bytes.

This comes from the DFS only being able to load programs consisting of a contiguous sequence of bytes. There is no provision for holes.

There is a useful assembler directive DSECT, which allows addresses to be allocated in a region of memory separated from the main code, thus helping to overcome the no-hole difficulty.

‘The editor is all things to all men’

For instance, to define zero-page usage for a program you could write:

```
        DSECT
        ORG &70
PTR     DS 2
BUFPTR  DS 2
COUNT   DS 1
        DEND
```

which defines a general (scratch) pointer address in &70 and &71, a pointer into the buffer in &72 and &73 and a count in &74. Within a DSECT DS doesn't create zero bytes and won't cause problems.

One of the most extraordinary things about this assembler is that it contains both conditional assembly and macros.

Conditional assembly allows the assembler to test a condition while it is assembling the program and, depending on whether the condition is true or false, assemble a part of the program, or not.

In fact it has an IF, THEN and ELSE structure so a test can assemble one or other of two bits of code depending on one condition.

+	Addition
–	Subtraction
*	Multiplication (as well as current address)
/	Division (Basic DIV)
£	Modulus (Basic MOD)
&	Bitwise AND (Basic AND)
!	Bitwise OR (Basic OR)
=	Logical equals with true being –1 and false 0 as in Basic
>	Logical greater than (as well as lsb)
<	Logical less than (as well as msb)
~	Bitwise NOT (1's complement)
–	Unary minus (two's complement)

Table II: Assembler arithmetic operators

Decimal numbers	0 to 65535
Hexadecimal numbers	& or $ followed by up to 4 hex digits
Binary numbers	% followed by up to 16 0s or 1s
Ascii character	Apostrophe, followed by a printing character followed by an optional apostrophe

Table III: Assembler constants

ORG	Set the address where the first byte of code will be.
EXEC	Set the execution address for the code.
EQU	Assigns a value to its label, like OSWRCH EQU &FFEE.
LST	Used to turn listing on and off during assembly.
TTL	Causes a title to be printed at the top of each page of listing.
ASC	Defines a string, ¦ may be used to put control characters into the string and ~ may be used to set bit 7 of the following character.
STR	As ASC but the string has a carriage return added to the end (MOS likes it).
DFB	Create a byte constant. Unlike EQUB more than one may be defined in a line.
DW	Create a 16 bit word constant. Again, more than one may be defined on a line.
DDB	Create a 16 bit constant but with the most significant byte first, contrary to normal 6502 practice.
DS	Used to allocate 1 or more bytes for a buffer (for instance).
HEX	Create a byte constant like DFB but all the numbers are assumed, by default, to be hex.

Table IV: Assembler pseudo-ops

To assemble a common piece of code for either the BBC Model A or B, the definition of top of memory addresses could be made conditional on whether a symbol called MODEL had been set to A or B.

The value would be set at the top of the program. To assemble a Model A version of the program it would be set to A. Anything else in the program which was model dependent – such as timing – could use conditional assembly to choose either VIA timing or a code loop.

Connected with this is a QUERY directive, which allows an even more immediate control of the assembly. The value of the label on the QUERY directive is assigned a value which is typed in in response to a prompt during pass 1 of the assembly.

Macros allow the programmer to code frequently used chunks of code once only and then, by using the macro name as an instruction, to get the code inserted in the assembly without any copying errors.

For instance, incrementing a 16 bit location is a piece of code which may be used several times in different parts of a program. The macro – given in the manual as an example – which replaces all these separate copies of the same code is:

```
INCW    MACRO
        INC @1
        BNE .INCW
        INC @1+1
.INCW
        ENDM
```

The operand @1 represents the macro parameter and the code will be generated differently, depending on

→

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TAB	Toggle display between Ascii and hex.
L	Toggle display between disassembled instructions and hex.
M	Set current address (as 1900M to set it to &1900).
RETURN	Advance current address by 1.
+	Advance current address by 8 (; also serves).
/	Take current address back 1.
–	Take current address back 8.
U	Change current address to the same as PC.
@	Change PC to be the same as the current address.
I	Set the current address to the address pointed to.
R	Set the current address to the (relative) address in a branch instruction.
G	Search for byte pattern.
N	Search for the next occurrence of the byte pattern.
hex	Change the byte pointed to by the current address to hex.
"	Type characters into memory starting at the current address.
P	Fill and test memory block.
S	Shift memory block.
V	Verify two blocks of memory.
.	Make the next displayed register the current register.
hex.	Alter the contents of the current register to hex.
Z	Execute the instruction pointed at by PC and stop (single step).
J	Jump to the given address and execute the routine (using JSR and Return).
K	Continue program execution from PC.

Table V: Spy commands

whether it is a location in zero page or an absolute address. A macro can have up to nine parameters.

A useful library of macros is given on the system disc and a LIBRARY program is included. So the macro library can be updated to contain your own favourites.

The editor is all things to all men. If you prefer to enter commands like "Move n characters" or "Delete n lines" you can, because almost all the commands may be entered either by using the function or cursor keys or as commands.

A printed function key slip is provided for use with the editor. Apart from the cursor keys and commands to move, delete and copy blocks of marked text, this is all you need. It is easy to use, and in my opinion is better than the Wordwise editor.

It is not possible to include here a list of the functions available with the editor. Suffice to say that with about 60 editing commands, eight file commands and about 20 formatting commands, no one will find the editor restrictive.

It starts in insert mode where every character typed pushes the character underneath the cursor to the right to give itself room.

You can change to overwrite mode if you find it more convenient and toggle back and forth as needed.

There are commands (or function keys) to go to the start of the text or to the end and to go forward or back a page or word.

At first the method of getting from one line to the next seems odd. Up cursor sends it to the start of the current line and you either have to use back cursor to get to the end of the previous line or up cursor again and forward cursor. You can't go from a character on one line directly to the character above or below it.

Pressing back arrow while at the beginning of a line sends the cursor to the end of the previous line.

You can delete lines, words or characters with a function key and insert lines as well.

As part of the formatting function, to activate printer functions you can enter control characters into the text by pressing a function key and then entering a character from A to Z, plus the five characters after Z to underscore.

But as CTRL-@ (NUL) is not permitted, owners of MX-80s will find that they cannot turn off underline.

The formatter does not have all the commands that Wordwise or View have – they boast a whole ROM to themselves – but it is sufficiently versatile to have produced the manual accompanying ADE.

As well as the commands to fill and justify, leave unjustified, indent, centre and so on, it also has a command to align text down the right margin which does not appear in either Wordwise or View.

‘The method of getting from one line to the next seems odd’

But it doesn't have any commands to set up headers or footers. Nor does it appear to have any means of printing the page number, though the pages are counted.

The filing commands allow the editor to be entered before a file is read in to edit. This also allows one file to be appended or inserted in another file. The normal way of using the editor, however, is to enter it with:

***EDIT filename**

which will do an automatic backup of the file.

When the edit is complete the original file is renamed to directory B (for backup) and the newly edited version is given 'filename'. So at all times you have the old version of the file safe in case something happens to the new version.

No longer do you have to remember to write the file to a new name every time you save it. It's all done for you and you can get on with designing the pounds while it looks after the pennies.

The section on the editor ends with two pages of error messages, what they mean and what action to take.

The debugger, Spy, is normally entered by the command *SPY. But it may also be entered from programs by using *FX100 – or the equivalent OSBYTE form – or typing a CTRL-F when the program is waiting for input.

On entry the contents of all the registers, including the program counter (PC), the stack pointer (SP) and 64 bytes of memory are displayed on the screen with the registers in a column on the top left and the 64 bytes of memory in the middle.

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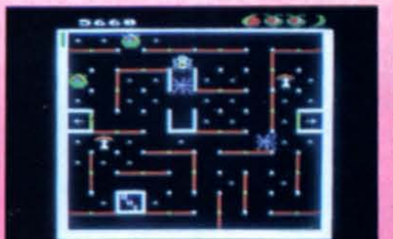

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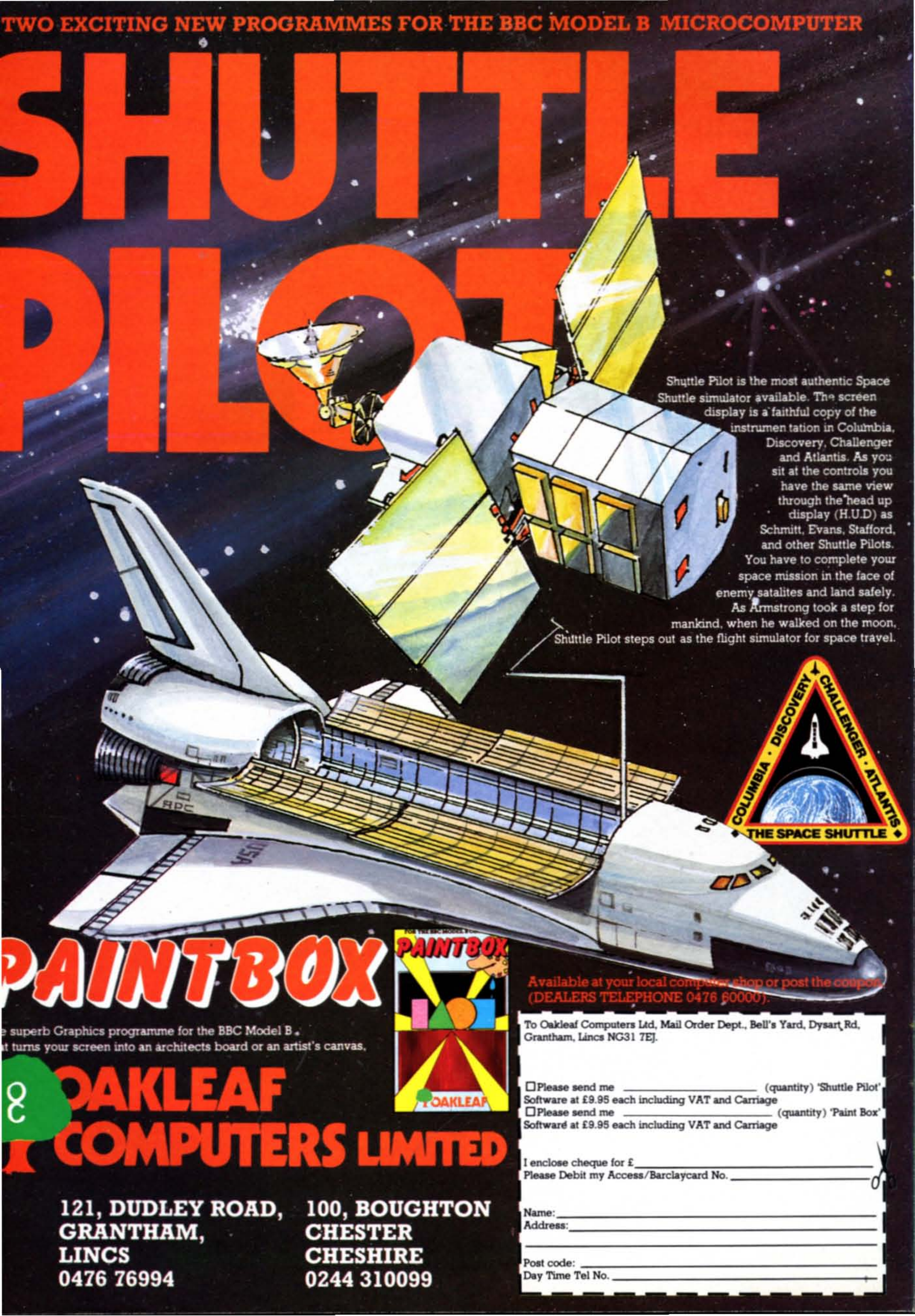
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after the address is also displayed.

The memory block is in lines of eight bytes preceded by the address of the first byte of each line. The address of the fourth line is picked out as the current address and the byte it addresses can be given a new value simply by entering the value and pressing Return (see Table V).

The memory display can be toggled between Ascii and hexadecimal, and between hexadecimal and disassembled instructions at the touch of a key.

Further instructions allow the current address to be changed and also move it forwards or backwards one location or in steps of eight.

The contents of any register may be changed by moving the current register pointer (the . command) and entering a new number followed by a period. The program counter may be altered to the current address, and contrariwise, the current address may be set to the contents of the PC.

The debugger performs admirably.

> **‘If your piggy bank will stand it buy this excellent system’**

To set breakpoints you have to set the first byte of the instruction to &00 yourself and, to continue, you have to change it back again afterwards.

I would have preferred this to have been automatic, but in practice it was no great obstacle.

I would also have liked to see a way of skipping across JSRs while single stepping, but this again can be done by setting a breakpoint the other side of the JSR.

The utility disc contains the source of the macro librarian, the macro library, a demo of the system and of the formatter used in the editor. The librarian and macro library are also in object code.

The librarian is used to create, alter or update any macro library, not only SYSLIB on the disc.

The source code of all four programs can serve as a tutorial in advanced assembler programming for the BBC Micro and in the use of the system.

There is also a demo program which simulates keyboard entry into the system, showing some of the commands and their effects.

To conclude, it is impossible to describe the ADE system adequately in the space of a review. I can only hope to give the reader enough information to decide whether or not it will be of use.

After having used it intensively for several weeks, I would say that if you frequently write programs of 50 or more lines of assembler and your piggy bank will stand it, then buy this excellent system.

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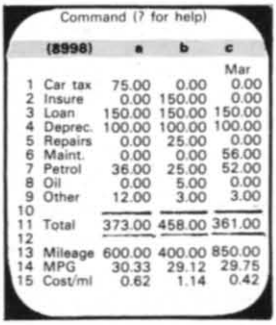

Command (? for help)

(8998)	a	b	c
			Mar
1 Car tax	75.00	0.00	0.00
2 Insure	0.00	150.00	0.00
3 Loan	150.00	150.00	150.00
4 Deprec.	100.00	100.00	100.00
5 Repairs	0.00	25.00	0.00
6 Maint.	0.00	0.00	56.00
7 Petrol	36.00	25.00	52.00
8 Oil	0.00	5.00	0.00
9 Other	12.00	3.00	3.00
10			
11 Total	373.00	458.00	361.00
12			
13 Mileage	600.00	400.00	850.00
14 MPG	30.33	29.12	29.75
15 Cost/ml	0.62	1.14	0.42

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Tel. (0903) 213174.

Sound Library listing

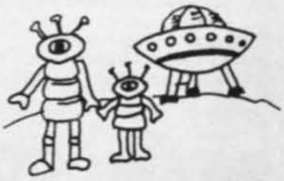
From Page 67

```
     PI1, PI2, PI3, PN1, PN2, PN3,
      AA,  AD,  AS,  AR, ALA, ALD"
    ELSE PRINT 'SPC (9);"C,   A,
       P,   D"
890 FOR l%=0 TO n%
900 REPEAT
    : INPUT TAB(x%,y%+3) "  ="para%

    : PRINT TAB(x%+3,y%+3) STRING$(
    LEN (STR$ (para%))," ")
    : UNTIL para%<=255 AND para%>=-128
910 PRINT TAB(x%,y%+3),para%
920 IF s$=e$
    THEN e%(l%,az%)=para%
    ELSE s%(l%,az%)=para%
930 x%=x%+5
940 NEXT
950 ENDPROC
960
970 DEF PROClisten
980 LOCAL wait%
990 PROCnames
1000 REPEAT
1010 PRINT TAB(1,19) "Sound (A-Z)
      ? ";
1020 REPEAT
     : az%=GET -65
     : UNTIL az%<=25 AND az%>=0
     OR az%=-52
1030 IF az%=-52
     THEN az%=26
     ELSE PRINT TAB(13,19) "= ";
     CHR$ (az%+65);
1040 VDU 23,1,0;0;0;0;
1050 ENVELOPE e%(0,az%),e%(1,az%)
     ,e%(2,az%),e%(3,az%),e%(4,az%)
     ,e%(5,az%),e%(6,az%),e%(7,az%)
     ,e%(8,az%),e%(9,az%),e%(10,az%)
     ,e%(11,az%),e%(12,az%),e%(13
     ,az%)
1060 SOUND s%(0,az%),s%(1,az%),s%(2
     ,az%),s%(3,az%)
1070 PROCstatement(e$,13,"e")
1080 PROCstatement(s$,3,"s")
1090 IF az%<>26
     THEN wait%=INKEY (s%(3,az%)*5)

     : *FX15,0
1100 PRINT TAB(15,19) " "
1110 VDU 23,1,1;0;0;0;
1120 UNTIL az%=26
1130 ENDPROC
1140
1150 DEF PROCnames
1160 LOCAL l%
1170 CLS
1180 PRINT TAB(31,2) "LISTEN TO SOUNDS
     "''
1190 FOR l%=0 TO 12
1200 PRINT " ";CHR$ (l%+65),name$(l%)
      TAB(41);CHR$ (l%+78),name$(l%+13)
1210 NEXT
1220 ENDPROC
1230
1240 DEF PROCstatement(s$,n%,a$)
1250 LOCAL l%
1260 PRINT ''SPC (5);s$;
1270 FOR l%=0 TO n%
1280 PRINT ;EVAL (a$+"%(l%,az%)");
1290 IF l%<>n% PRINT ",";
     ELSE REPEAT
     : PRINT " ";
     : UNTIL POS =78
1300 NEXT
1310 ENDPROC
1320
1330 DEF PROCsavefile
1340 LOCAL fname$,max%,sf%,k%,l%
     ,wait%
1350 CLS
1360 PRINT TAB(34,2) "SAVE FILE"
1370 INPUT TAB(1,5) "Filename ? "fname$
1380 IF fname$=""
     THEN ENDPROC
1390 PRINT TAB(10,5) "="''" ";
1400 max%=FNmax
1410 sf%=OPENOUT fname$
1420 PRINT ''" Recording ";max%;"
      sounds...";
1430 PRINT #sf%,max%
1440 FOR k%=0 TO max%
1450 PRINT #sf%,name$(k%)
1460 FOR l%=0 TO 13
1470 PRINT #sf%,e%(l%,k%)
1480 IF l%<4
     THEN PRINT #sf%,s%(l%,k%)
1490 NEXT
     : NEXT
1500 CLOSE #sf%
1510 PRINT '''" Switch off recorder.";
1520 wait%=INKEY (400)
1530 ENDPROC
1540
1550 DEF FNmax
1560 LOCAL c%
1570 c%=-1
1580 REPEAT
     : c%=c%+1
     : UNTIL name$(c%)=""
1590 =c%
1600
1610 DATA 1,3,3,4,100,90,20,-15,-15
     ,10,20,20,126,0,0,-126,126,126
```

This listing is included in this month's cassette tape offer. See order form on Page 181.

```
SOUND AN ALARM
ENVELOPE 1,5,1,2,80,15,0,0,
126,0,0,-126,126,126
SOUND 1,1,25,254
```

It seemed a shame to present you with such a useful Sound Library program without any sounds to put in it, so we prevailed upon the Editor of Electron User to give us some of his from Sounds Exciting collection. I think someone out there ought to write a roar of approval for him . . .



```
SOUND E THE MARTIAN'S APPROACH
ENVELOPE 4,12,10,8,6,4,0,0,
126,0,0,-126,126,126
SOUND 0,4,4,254
```

```
SOUND B ALARM CLOCK
ENVELOPE 6,1,70,16,2,2,0,0,
126,0,0,-126,126,126
SOUND 1,6,100,254
```

```
SOUND C WARSHIP'S SIREN
ENVELOPE 2,1,5,0,0,25,0,0,
126,0,0,-126,126,126
SOUND 1,2,40,254
```

```
SOUND D ROAD WORKS
ENVELOPE 5,1,70,16,0,31,0,0,
126,0,0,-126,126,126
SOUND 0,5,80,254
```

```
SOUND F SWALLOWED IN ONE GULP
ENVELOPE 1,1,43,0,0,100,0,0,
126,0,0,-126,126,126
SOUND 1,1,17,18
```

Sound Library listing

From Page 133

```
SOUND G HAR HAR
ENVELOPE 1,6,126,0,0,206,0,0,
126,0,0,-126,126,126
SOUND 1,1,100,200

SOUND H CAR STARTING
ENVELOPE 1,1,3,0,0,7,7,0,
126,0,0,-126,126,126
SOUND 0,1,63,84

SOUND I GOING UP
ENVELOPE 4,16,16,1,1,200,0,0,
126,0,0,-126,126,126
SOUND 1,4,30,36

SOUND J FANFARE
ENVELOPE 2,2,6,0,0,255,0,0,
126,0,0,-126,126,126
SOUND 1,2,4,50

SOUND K MACHINE GUN
ENVELOPE 3,3,6,4,6,2,0,0,
126,0,0,-126,126,126
SOUND 1,3,4,48
```

```
SOUND L WAILING BUGS
ENVELOPE 4,4,-1,1,0,20,20,0,
126,0,0,-126,126,126
SOUND 1,4,200,254

SOUND M IN THE FACTORY
ENVELOPE 1,5,1,20,8,200,0,0,
126,0,0,-126,126,126
SOUND 0,1,1,200

SOUND N ELECTRIC SPARK
ENVELOPE 0,0,0,0,0,0,
0,0,0,0,0,0,0,0
SOUND 0,-15,7,254

SOUND O POLICE SIREN
ENVELOPE 1,1,-7,7,0,10,10,0,
126,0,0,-126,126,126
SOUND 1,1,136,254

SOUND P UP AND AWAY
ENVELOPE 2,1,1,0,0,200,0,0,
126,0,0,-126,126,126
SOUND 1,2,0,40
```

```
SOUND Q CRAZY MACHINERY
ENVELOPE 5,1,70,6,0,31,10,0,
126,0,0,-126,126,126
SOUND 1,5,100,254

SOUND R ATTACK BY MUTANT FLIES
ENVELOPE 6,1,36,-36,0,20,20,0,
126,0,0,-126,126,126
SOUND 1,6,160,254

SOUND S BUBBLES
ENVELOPE 1,1,25,25,25,8,8,8,
127, 127,127,127,127,127
SOUND 1,1,200,20

SOUND T TUNE
ENVELOPE 2,28,-108,-17,-19,61,
76, 193,-63,-117,-1,-50,107,74
SOUND 1,2,100,150

SOUND U REVERBERATION
ENVELOPE 2,8,1,-1,1,1,1,1,
121,-10,-5,-2,120,120
SOUND 0,2,0,40
```

```
SOUND V STATIC
ENVELOPE 0,0,0,0,0,0,
0,0,0,0,0,0,0,0
SOUND 4,-15,100,254

SOUND W SPLASH
ENVELOPE 1,129,0,-10,-1,1,0,
2,6,-1,0,-1,126,74
SOUND 0,1,7,14

SOUND X CHIME PART1
ENVELOPE 1,1,0,0,0,50,25,25,
127,-1,-1,-1,126,90
SOUND 1,1,150,8

SOUND Y CHIME PART2
ENVELOPE 1,1,0,0,0,50,25,25,
127,-1,-1,-1,126,90
SOUND 1,1,140,5

SOUND Z GUN
ENVELOPE 1,1,0,0,0,0,0,0,
126,-1,0,-3,126,126
SOUND 0,1,6,4
```

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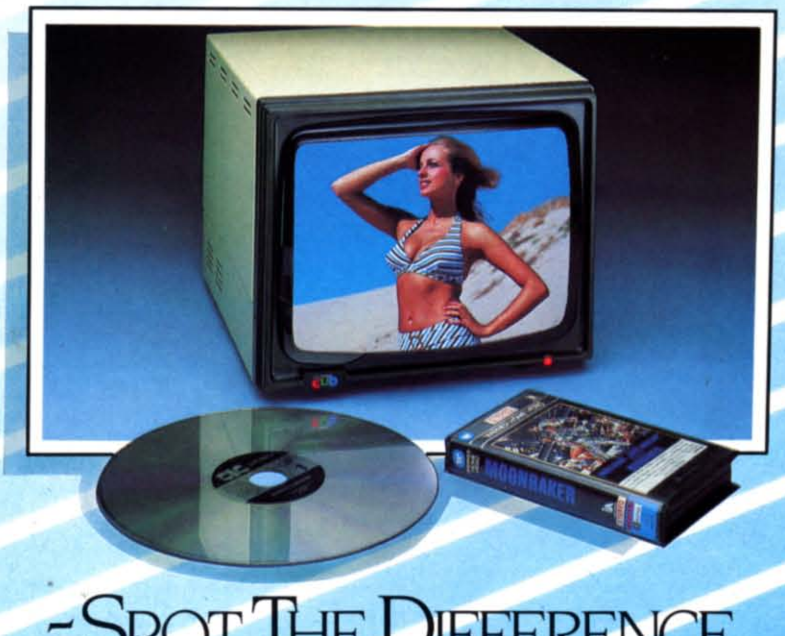
BREATHTAKING IMAGES FROM DISC OR CASSETTE

BREATHTAKING IMAGES FROM DISC OR CASSETTE



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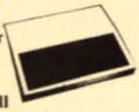

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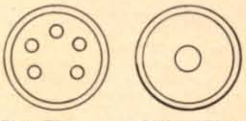

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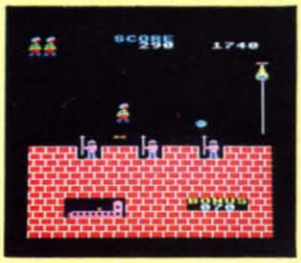

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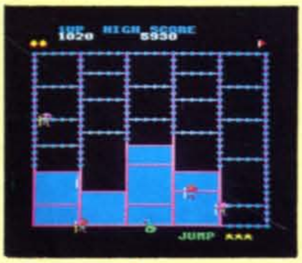

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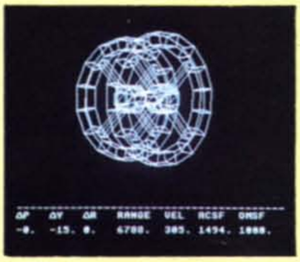

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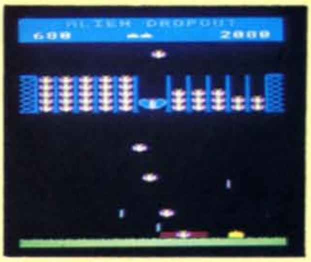

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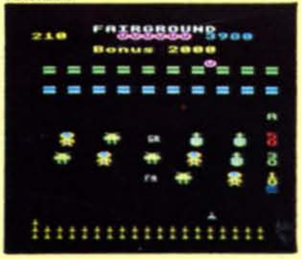

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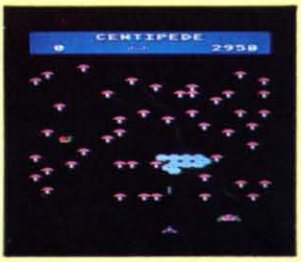

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Incredible arcade-style game featuring mushrooms, snails, flies, spiders, and the centipedes of course. Excellent graphics and sound. 6 skill levels, hi-score, rankings, bonuses, and increasing difficulty as the spiders become more lively and the number of mushrooms increases.
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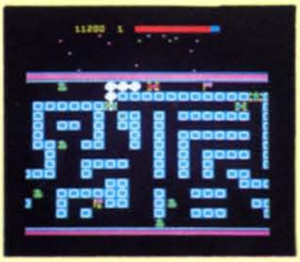

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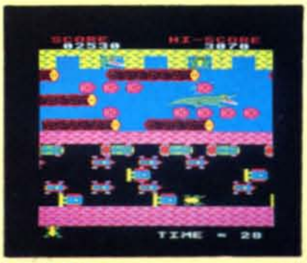

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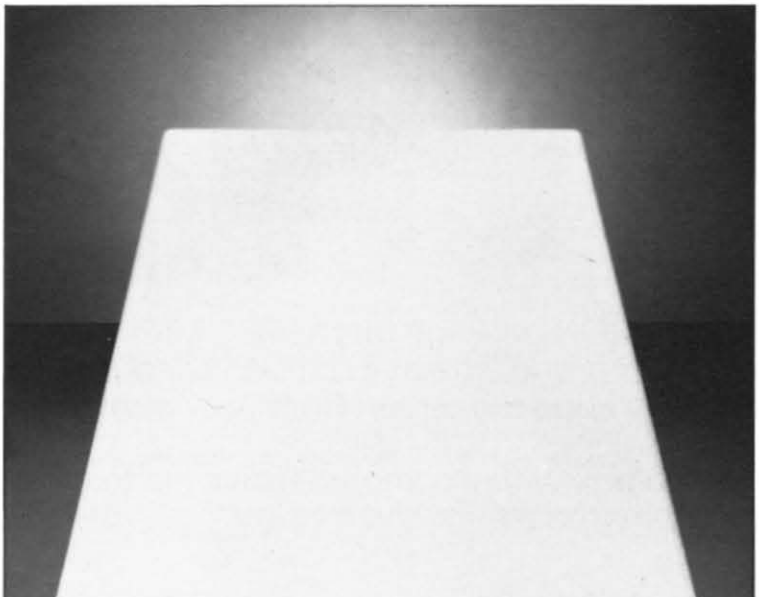

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TOO MUCH DIMMING CAN DAMAGE YOUR MEMORY

By DAVID LEWIS

WHEN you write any sort of file program it is usual to put the data into arrays. Usually the file is divided into fields, such as NAME$(N), FSTNAME$(N), ADDRESS$(N), AGE$(N), and so on.

A typical file will want to have a hundred or so records, each divided into say 12 fields.

Now these arrays need dimensioning. You may make sure of plenty of space by writing DIM NAME$(200), FSTNAME$(200), etc. Then you run the program, and start entering actual records.

All is going well. You have 60 records in the memory and you are just thinking of saving the file before breaking for a well-earned cup of coffee.

One more record goes in – and suddenly the dreaded message "No room" appears.

Disaster! Not only is all your work wasted, but you can't understand why your BBC Micro has closed up on you so soon.

You had put in about 60 records of 120 characters each. That took about 7k of memory. Even if you had a 12k program in Mode 7 that should still have left at least 10k of memory unused.

So the memory just can't be full ... can it?

Oh yes, it can. You see, you used up 10k of memory when you wrote those "make sure" DIMs – and two thirds of the space you used was wasted.

Here is the way it works. When you write DIM NAME$(200), that doesn't reserve space for the name strings. It couldn't, because no one knows the length of each string. What the computer does is reserve space for the addresses of the name strings.

Each completed element in the array will have an address, taking two bytes, and two numbers, taking one byte each.

As an example, the 8 bytes of the address section from 4100 hex to 4107 hex, when filled might look like Figure I.

70 5A	08	08	78 5A	12	12
Address of data string	Space used for string	Length of string	Address of next data string	Space used	Length of string

Figure I: String storage (in hexadecimal)

The address space was empty at the DIM stage, as neither the addresses nor the length of the strings were known. DIM NAME$(200) reserved 800 bytes of memory (200 × 4) in the address section.

You used 12 fields, so the total space reserved for addresses took 12 × 800 bytes – nearly 10k of memory.

The computer also allows some working space, immediately above the Basic program. So the memory map looks like Figure II.

The actual file data in our example started at 6500 hex. HIMEM is at 7000, so you had less than 6k of memory available for the data.

No wonder that it hit the roof when you had only about 60 records stored.

Now at this point if you examine the memory you will find only one third of the address space has been used, leaving 6k of empty, wasted space, between 4E00 and 6500 hex.

You have saved enough address space for 200 records, but you only have enough data space for 60 records.

What can be done about this waste? The answer is to calculate the maximum number of records very carefully. Then you use it to make sure that you reserve the absolute minimum of address space, by a minimum dimension statement.

- Work out the average or maximum number of characters in each record. For example, NAME (15 characters),

→

From Page 141

FSTNAME (15), ADDRESS (40), AGE (2), etc. Let us say that this comes to 120 characters.

- Add the number of fields, say 12, multiplied by 4, which means add 48. This gives a new total of 168 characters for each record.
- Find HIMEM and subtract TOP. (If your program is loaded, you can find these numbers by PRINT HIMEM, and PRINT TOP.)

Example:

31744 – 14286 = 17458

- Subtract 2,500, for working space above the program:

17458 – 2500 = 14958

- Divide by 168:

14958/168 = 89

- That is the maximum number of records so write in your program:

DIM NAME$(89), FSTNAME$(89), *etc.*

You can get the computer to do the whole calculation, of course. You enter T for the total characters in all fields, and NUM for the number of fields.

Then:

MAX = (HIMEM – TOP – 2500) / (T + 4 * NUM)

Finally:

DIM NAME$(MAX), FSTNAME$ (MAX), ADDRESS$(MAX), *etc.*

This set of notes should enable you to store the maximum number of records, but it leaves one question unanswered – what are we to use for T?

The maximum number of characters in any field may be very different from the average in the actual file.

There are many people with short names, such as Joe Bloggs of 5 West Street, and a few people with long names, such as Marmaduke Standingworthy of The Larches, Fotheringham Avenue.

If, when you have built your file, you are only going to search through it, display it or print parts of it, you can take T as the average number of characters in a record.

In this case a typical file, with its records divided into 12 fields, may have maximum numbers of characters up to 120, while the average comes out at about 50 characters.

By using T = 60 in the above formula you allow space for over 180 records, instead of the 89 calculated using the maximum characters.

But what else do you want to do with the file? Do you want to constantly edit it, changing the positions of the long records, again and again? Or do you want to sort it into alphabetical order, or into date of birth order?

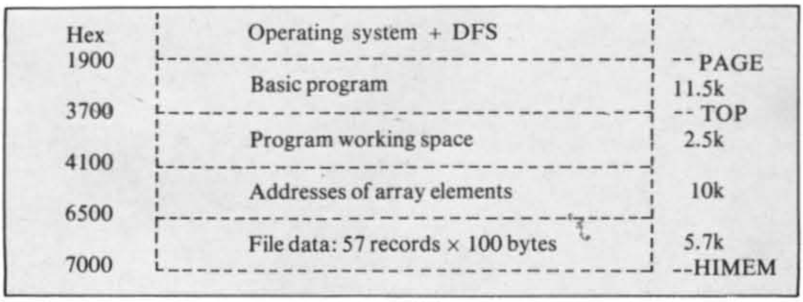

Figure II

In that case, your friend Marmaduke may start at the top of the list, and be passed down through nearly every array element in turn until the SORT routine finds him his proper place near the bottom of the list.

Each array element must, in this case, be long enough to contain the longest string, or else the computer will have to make extra space for the long records, wasting the space already given to the short records.

You must reserve this array space before you establish the file:

- Add together the maximum number of characters in each field, to determine T.
- Use T to find MAX: write the DIM statements, using MAX.
- Immediately after the DIM statements, write:

```
FOR X = 1 TO MAX
NAME$(X)=STRING$(MN," ") : NAME$(X)=""
FSTNAME$(X)=STRING$(MF," ") : FSTNAME$(X)=""
AGE$(X)=STRING$(MA," ") :AGE$(X)=""
```

and so on, where MN, MF, MA are the maximum numbers of characters in the respective fields.

The eight address bytes for Bloggs, Joe will appear as in Figure III.

70 5A	10	06	80 5A	10	03
Address of "Bloggs"	16 bytes reserved	6 bytes used	Address of "Joe"	16 bytes reserved	3 bytes used

Figure III

The 16 bytes reserved between 5A70 and 5A80 will allow STANDINGWORTHY to fit in, during the sort process, without the computer having to find a new place for the long name, wasting the old space completely.

Of course it is unfortunate that the total number of records will be cut drastically. But the facility to sort files at any time is one of the great advantages of a computer and should not be given up lightly.

Is there any way of lessening that four bytes of address space per record per field?

The four bytes are particularly irking if the field itself is a one letter code such as M or F, or AGE, using only two characters at most.

Well, you could put the whole record in one array element, RECORD$(N), and allow 128 bytes for each element.

Then you would write a sub-routine to analyse the record string, looking for dividers. So RECORD$(1) might be BLOGGS/JOE/10 LEST ST/47/, etc.

This might be the subject of another article, but for the moment I hope that I have shed a little more light into the memory system and the storage of array variables in our favourite computer.

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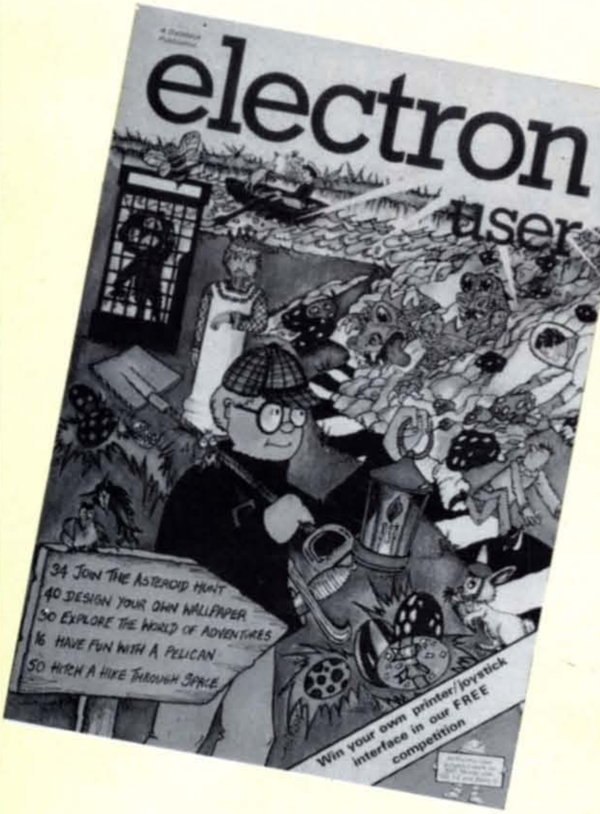

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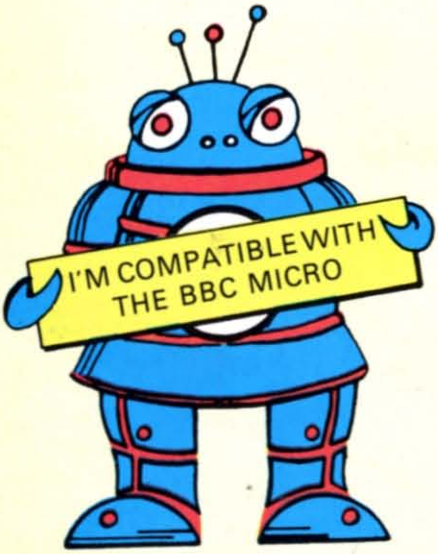
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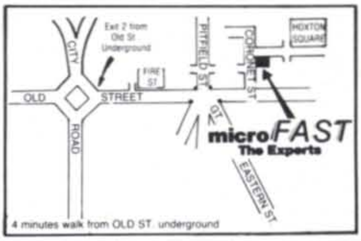

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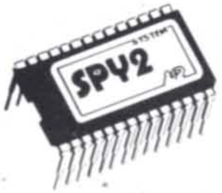

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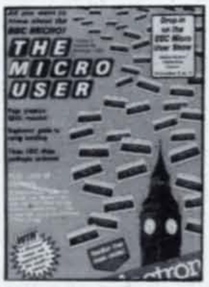

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A day in the life of a school's computer lab

Following his article describing a cheap "network" for the BBC Micro in last month's *The Micro User*, many readers have expressed an interest in hearing more about Tony Craven's computer lab. Well, we're always willing to oblige . . .

By TONY CRAVEN

THE other day I found myself explaining to a colleague just what it was we did with all our "expensive" computers. He was moaning about not being able to afford books and inquiring, none too gently, how we could justify ourselves.

I told him about a typical day in our computer room, and I think I got somewhere. At least he muttered something about dropping in some time.

Now I know that Micro users need no justification as to the whys and wherefores of the new technology, but you might be interested to hear what we do. So here goes . . .

8.30am: Members of staff who borrowed equipment overnight stagger in to return their "homework". Some teachers prefer to work in the quiet of their homes, presumably where no student can peep over their shoulder and crib the answers to next week's test.

Actually it is important that the teachers do preview thoroughly the Computer Assisted Learning programs so that the class can get straight to the point, possibly with a printed worksheet to guide them.

9.15am: The doors open and a class of 22 third form geographers streams in. They are to work on a simulation program written by their teacher which allows them to "live out" a life as a farmer in India.

This teacher is familiar with the network downloading system we described in the March issue of *The Micro User* and he soon has all 10 BBCs, nine of them Tape Filing Systems, loaded with his 20k program.

He will have picked out the disc containing the program he wants from the college software library held in the computer room.

Over the last 18 months we have been able to acquire a wide range of educational programs from all sorts of sources. Some we've begged, some borrowed, and some . . . no, we haven't stolen any knowingly.

10.15am: Out go the third formers and in comes a sixth form Computer Studies class. This is a project development session and so each student downloads his or her program saved from the last session through the RS423 port linked to the disc machine.

The teacher can move from micro to micro helping and suggesting on a variety of programs being developed, from simple databases to airline booking simulations.

At the end of the class the programs are saved back through the network onto the same disc, using the same filename for ready access next time.

Using the same filename writes over the previous version and keeps the file updated.

11am: After break the room is normally free, but an A level physics group wanders in. Can the BBC Micro help? They think they know the relationship between a Geiger counter reading and the amount of radioactive sample, but would like to see this mathematical function displayed as a graph.

We have a very useful program for this purpose which will plot any graph if you tell it the functional relationship. They depart satisfied.

12.30pm: Lunch time, but the BBC Micros keep going. Some lunch times we have an open house, but today it's a beginners' programming course open to all comers in the sixth form.

About 20 students are booked in on this and they all work in pairs, following a self instruction booklet written by a member of staff.

Some will go on to write their own programs. Others will be happy just to understand a little bit more about the power and limitations of a computer.

1.15pm: A science technician spirits a micro away. It's going to be used in a chemistry lab, monitoring the pH of a solution as acid is titrated in, and then plotting the appropriate graph.

For this application an analogue to digital converter interface is plugged in and a pH probe connected.

The software for this was also written in-house, and is one of several applications of the computer in monitoring and controlling science experiments.

1.30pm: A group of students in the college following a 21 hour course in community drama now arrives for a weekly session on information technology awareness.

They explore the uses of the micro in some of its many aspects – word processing, database creation, data retrieval, simulation programs, etc.

2.15pm: Ten sixth form O level French students take their places for a lesson. A technician has quickly loaded up a program called Gangsters into 10 micros (what would we do without the RS 423 port?).

This program, also written by a member of staff, is a simple database containing the descriptions of several gangsters.

The students must look at descriptions obtained from witnesses to a crime and interrogate the computer to identify the criminal.

The twist to the plot is that all questions, instructions and answers are in French.

3.30pm: The bell for the end of the day rings, but the micros hum on. It's open house again and even a few games are now allowed.

One student is using Wordwise to correct a draft of her project essay in A level art – simple Wordwise files can be easily pushed in through the port from a disc machine.

A teacher is using the Notts. database to update his department records, held on disc, with the latest test scores – students, not cricket.

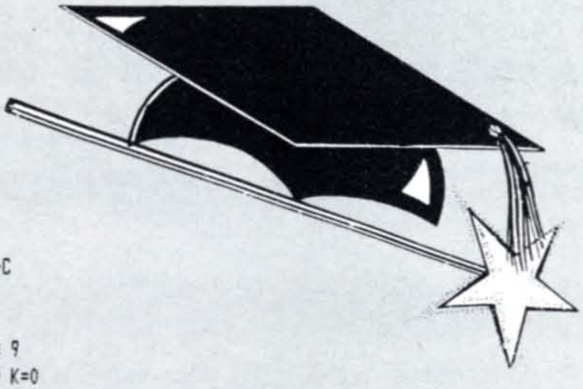
Several students are continuing their computer studies projects, and one is using a graphics design program containing a printer screen dump to draw the title page for his project report.

4.30pm: By threatening to cut off their power mid-program, everyone is persuaded to stop, SAVE, and go home.

The room is quiet and dark, except for one micro in the corner which has a thermocouple thermometer attached to its A to D interface, hanging out of the window ready to monitor the air temperature overnight for the following day's geography lesson.

Magic Squares listing

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of The Micro User.



From Page 59

```
1 DIM A(9).B(9)
2 *FX229,1
3 *FX4,1
4 *KEY10 OLD|MRUN|M
5 ON ERROR GOTO 162
6 MODE 7
7 PROCi
8 REPEAT
9 MODE 7
10 PROCs
11 REPEAT
12 VDU 28,0,20,35,0
13 PROCp
14 PROCa
15 UNTIL M=9
16 PROCd
17 PROCg
18 UNTIL LEFT$(R$,1)="N"OR LEFT$(R$
   ,1)="n"
19 MODE 7
20 *FX229,0
21 *FX4,0
22 PRINT TAB(5,5)CHR$ 141;CHR$ 134;
   "BYE BYE"
23 PRINT TAB(5)CHR$ 141;CHR$ 134;
   "BYE BYE"
24 PRINT TAB(5,8)CHR$ 131;"Type
    "CHR$ 136;"BREAK "CHR$ 137;
   "<137>for another go"
25 END
26 DEF PROCs
27 M=6
   :J=0
28 REPEAT
29 A=RND(9)
   :B=RND(9)
   :C=RND(9)
30 UNTIL A<>B AND A<>C AND B<>C
31 A(1)=A+B
32 A(2)=A-B-C
33 A(3)=A+C
34 A(4)=A-B+C
35 A(5)=A
36 A(6)=A+B-C
37 A(7)=A-C
38 A(8)=A+B+C
39 A(9)=A-B
40 K=1
41 FOR Z=1TO 9
42 IF A(Z)=0 K=0
43 NEXT
44 IF K=0
   THEN 27
45 FOR Z=1TO 9
46 B(Z)=A(Z)
47 NEXT
48 B(ABS (A))=0
49 B(ABS (B))=0
50 B(ABS (C))=0
51 ENDPROC
52 DEF PROCp
53 J=J+1
54 PRINT TAB(3,3);CHR$ (128+
   RND(5));" MAGIC SQUARE"
55 PRINT TAB(3);CHR$ (128+RND(5));
   " ============"
56 X=0
   :Y=8
57 FOR Z=1TO 9
58 X=X+5
59 IF B(Z)=0 PRINT TAB(X-1,Y);
   CHR$ 129;CHR$ 136;"?"CHR$ 137;
   :GOTO 63
60 IF B(Z)<-9X=X-1
61 IF B(Z)>9OR B(Z)<0X=X-1
62 PRINT TAB(X,Y);CHR$ (129+
   RND(4));B(Z);
63 IF B(Z)<-9X=X+1
64 IF B(Z)>9OR B(Z)<0 X=X+1
65 IF Z=3OR Z=6 Y=Y+3
   :X=0
   :PRINT
   :PRINT
   :PRINT
66 NEXT
67 IF M<9 PRINT ''CHR$ (128+
   RND(5));"You have "9-M;" to solve
   "
68 ENDPROC
69 DEF PROCa
70 M=0
71 VDU 28,0,22,39,18
72 PRINT CHR$ (128+RND(5));"Please
    type in your guess (number ";J;
   ")"
73 PRINT CHR$ (128+RND(5));"(then
    press RETURN)"
74 *FX15,0
75 W$=FNinput("9","-",3)
   :W=VAL (W$)
   :IF W=0 CLS
   :PRINT "A non-zero number please!
   "
   :GOTO 72
76 IF A(ABS (A))=W B(ABS (A))=W
   :A(ABS (A))=0
   :PROCr
   :GOTO 80
77 IF A(ABS (B))=W B(ABS (B))=W
   :A(ABS (B))=0
   :PROCr
   :GOTO 80
78 IF A(ABS (C))=W B(ABS (C))=W
   :A(ABS (C))=0
   :PROCr
   :GOTO 80
79 PROCw
80 FOR Z=1TO 9
81 IF B(Z)<>0 M=M+1
82 NEXT Z
83 PROCm(2.5)
   :CLS
84 ENDPROC
85 DEF PROCq
86 PROCm(2)
   :CLS
87 PRINT TAB(3,3);CHR$ (128+
   RND(5));"Want another game ?"
88 PRINT TAB(1,6);CHR$ (128+
   RND(5));"(Type Y or N, then press
    RETURN key)"
89 *FX15,0
```

→

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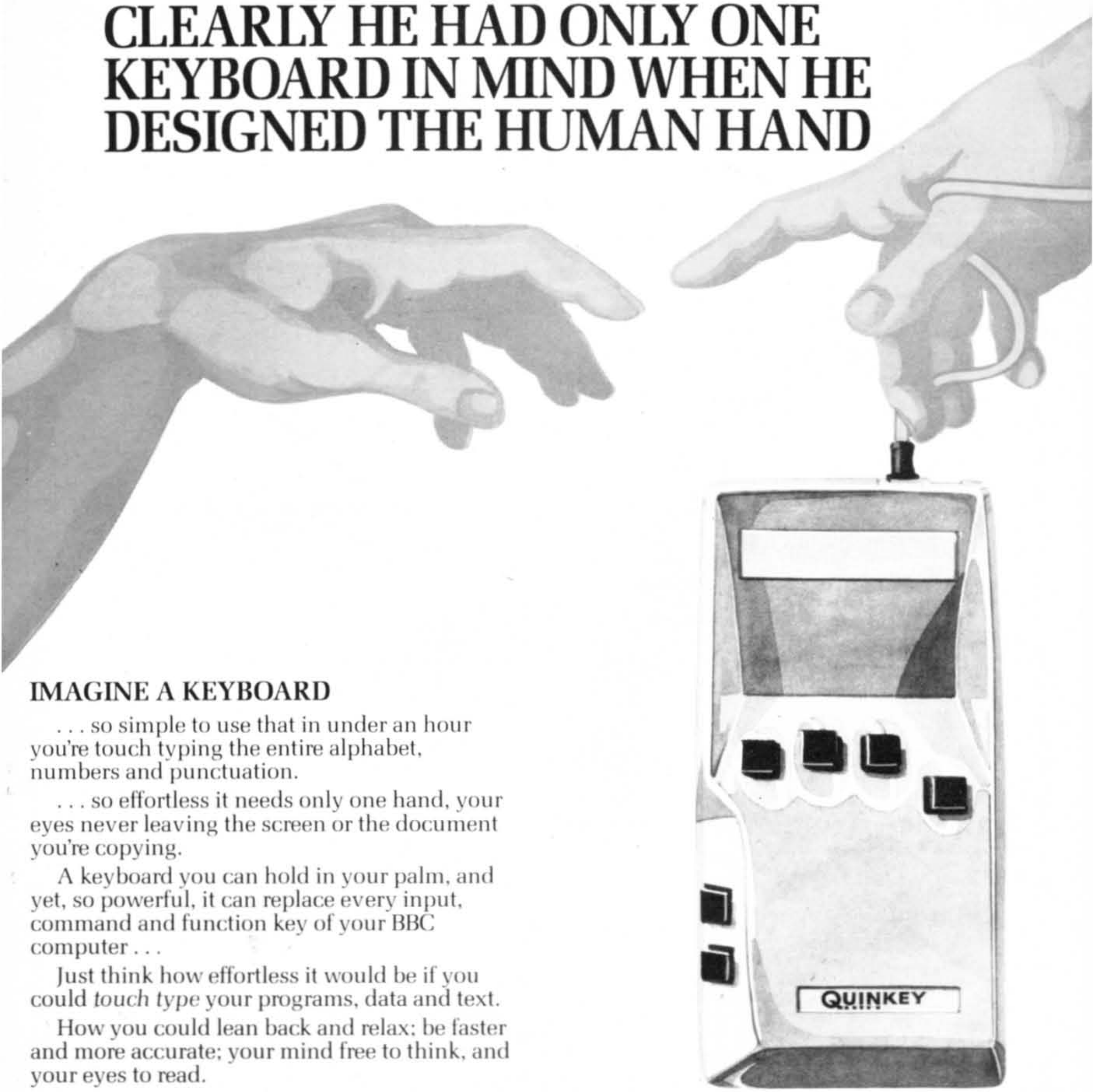
CLEARLY HE HAD ONLY ONE KEYBOARD IN MIND WHEN HE DESIGNED THE HUMAN HAND



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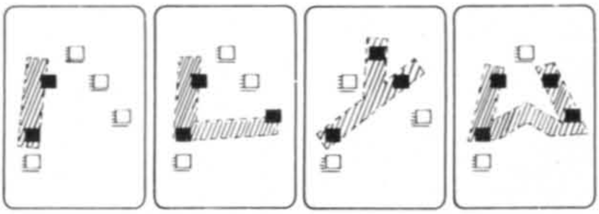
Look at these diagrams:



See how the lines joining the key combinations form the characters? For each letter there's an instantly recognised and easily memorised visual clue.

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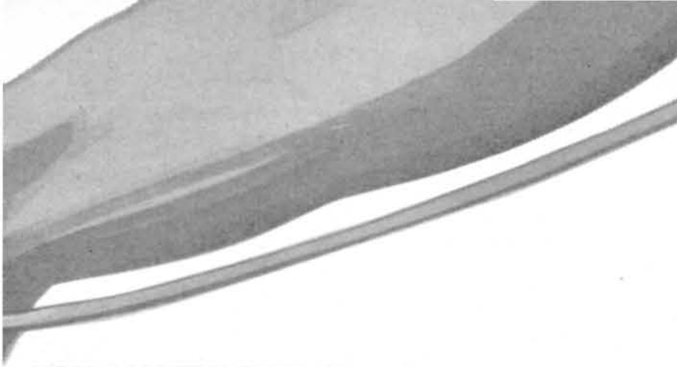

YOU CAN TRY IT NOW!

Rest the fingers of your right hand on a table top. Imagine the keys.

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★ Comprehensive Quinkey manual.

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"PROG" enables your BBC to recognise and interpret the signals from the Quinkey keyboard. It combines easily with your application programs enabling you to use Quinkey as a comprehensive alternative keyboard.

"WP" optimises Quinkey to work with word-processing packages "Wordwise", "View" and "Edword" – a perfect text-writing combination.

TECHNICAL DATA:
Loading length: &605. Running length: &300.
No zero-page locations, all ADC channels.
Interrupt service vector IRQ2V, correctly chained.

TESTED COMPATIBILITY

BBC Model "B"	Acorn
OS 1.2	
BASIC I or BASIC II (unless using INKEY with negative argument)	Acorn
DFS 0.90	Acorn
View A1.4	Acornsoft
Wordwise 1.17	Computer Concepts
Edword	Clwyd Technics

KEYBOARD RANGE

All BBC "B" keyboard inputs generate from the Quinkey, except the Hard-wired key, "Break"

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microwriter
QUINKEY
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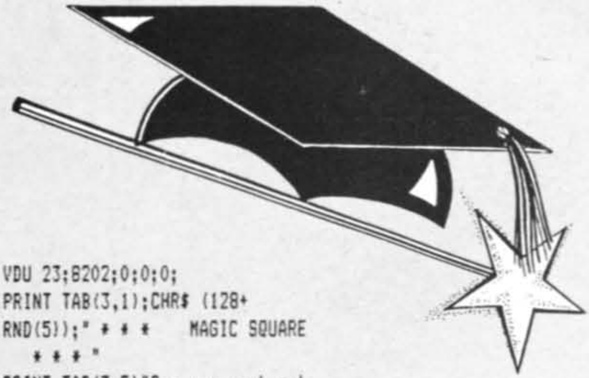
Magic Squares listing

From Page 148

```
 90 INPUT R$
 91 ENDPROC
 92 DEF PROCd
 93 VDU 26
 94 CLS
 95 PROCp
 96 PROCz
 97 PRINT TAB(0,20)CHR$ (128+
    RND(5));"You have solved it !
     Well done !"
 98 PRINT CHR$ (128+RND(5));"You
     took ";J-1;" guesses."
 99 PROCm(6)
100 ENDPROC
101 DEF PROCr
102 PRINT TAB(1,20)"You are right
     !!"
103 FOR K=1TO 7
104 READ L,P,T
105 SOUND 2,-L,P,T
106 NEXT
107 DATA 15,101,4,15,81,1.3,0,0
    ,.7,15,81,1.3,0,0,.7,15,89,4
    ,15,81,4
108 RESTORE
109 PROCm(1)
110 PRINT
    :PRINT
111 ENDPROC
112 DEF PROCw
113 PRINT TAB(1,20)"You are wrong
     !!"
114 SOUND 0,-15,7,20
115 FOR K=240TO 180STEP -3
116 SOUND 1,0,K,1
117 NEXT K
118 PROCm(1)
119 PRINT
    :PRINT
120 ENDPROC
121 DEF PROCz
122 PROCr
123 PROCr
124 SOUND 1,-15,81,10
125 SOUND 2,-15,97,10
126 SOUND 3,-15,61,10
127 SOUND 1,-15,69,15
128 SOUND 2,-15,81,15
129 SOUND 3,-15,101,15
130 ENDPROC
131 DEF PROCi
132 *FX15,0
```



```
133 VDU 23;8202;0;0;0;
134 PRINT TAB(3,1);CHR$ (128+
    RND(5));" * * *   MAGIC SQUARE
      * * * "
135 PRINT TAB(3,5)"Can you work out
     the 3 unknown ";CHR$ (128+
    RND(5));"?";"'s"
136 PRINT TAB(3,7)"Which will make
     every "
137 PRINT TAB(2,9);CHR$ (128+
    RND(5));"ROW ";CHR$ (128+
    RND(5));",COLUMN & ";CHR$ (128+
    RND(5));"DIAGONAL"
138 PRINT TAB(3,11)"add up to the
     same amount ?"
139 PROCu
140 CLS
141 PRINT TAB(3,3)"for example..."
142 PROCm(1)
143 PROCs
144 M=9
145 VDU 28,0,20,18,0
146 PROCp
147 PROCu
148 B(ABS (A))=A(ABS (A))
    :B(ABS (B))=A(ABS (B))
    :B(ABS (C))=A(ABS (C))
149 PRINT TAB(3,3)"The answer is
     ..."
150 PROCm(1)
151 VDU 28,19,20,38,0
152 PROCp
153 PRINT '''"   Each line adds"
    :PRINT "   up to ";CHR$ (128+
    RND(5));3*A
154 PROCu
155 ENDPROC
156 DEF PROCu
157 VDU 26
158 PRINT TAB(3,23)"( Hit any key
     to continue )"
159 *FX15,0
160 Q$=GET$
161 ENDPROC
162 REPORT
    :PRINT ;" at line "ERL
    :END
163 DEF FNinput(High$,Low$,Num)
164 LOCAL h,l,c,e,d
165 LOCAL r,t$,e$
166 LET d=127
    :LET r=13
167 LET h=ASC (High$)
    :LET l=ASC (Low$)
168 LET c=0
169 REPEAT
170 REPEAT
171 REPEAT
172 Ok=FALSE
173 LET e$=GET$
174 e=ASC (e$)
175 IF e>=l AND e<=h Ok=TRUE
176 UNTIL (c=0 AND e<>d)OR ((c>0)
    AND (c<Num))OR (c=Num AND
    NOT Ok)
177 UNTIL Ok OR e=d OR e=r
178 LET c=c+1
179 IF e=d c=c-2
180 IF e=r c=c-1
181 LET t$=t$+e$
182 LET t$=LEFT$(t$,c)
183 IF e<>r PRINT e$;
184 UNTIL (c<=Num AND e=r)
185 PRINT
186 =t$
187 DEF PROCm(z)
188 LOCAL f
189 f=50*z
190 f=TIME +f
191 REPEAT
192 UNTIL TIME >f
193 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 181.

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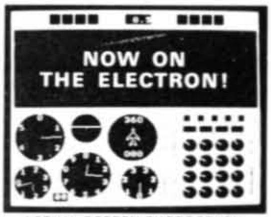

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Seawall listing

From Page 49

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of The Micro User.

```
 10 REM ***************
 20 REM ****SEAWALL****
 30 REM ***************
 40 REM *by S.R.Lovick*
 50 REM ***************
 60 REM *(C)MICRO USER*
 70 REM ***************
 80 ON ERROR GOTO 3090
 90 *FX11,0
100 MODE 7
110 PROCintro
120 MODE 2
130 VDU 20
140 VDU 23;11,0;0;0;0
150 stack%=0
    :try%=0
160 PROCdefine
170 PROCtitle
180 PROCbench
190 REPEAT
200 PROCsea
210 PROCmanready(12,15)
220 A%=RND(4+L%)
    :B%=RND(4+L%)
    :choice%=RND(2)
230 C%=A%+B%
240 IF choice%=1
    THEN PROCadd
    ELSE PROCsubtract
250 INPUT TAB(0,7)"answer is "ans
    :try%=try%+1
260 IF choice%=1
    THEN PROCaddans
    ELSE PROCsubtractans
270 IF D%=1
    THEN 390
    ELSE 280
280 E=INKEY (100)
290 IF 21-try%<=18-stack%
    THEN 330
300 COLOUR 129
    :COLOUR 7
    :PRINT TAB(0,9)"wrong"
310 PROCsea
320 COLOUR 129
    :COLOUR 7
    :PRINT TAB(0,11)"try again"
    :E=INKEY (200)
330 FOR row=7TO 11
340 COLOUR 128
350 PRINT TAB(0,row)STRING$(18
    ," ")
360 NEXT
370 IF 21-try%<=18-stack%
    THEN 590
380 IF D%=0
    THEN 250
390 COLOUR 129
    :COLOUR 7
    :PRINT TAB(0,9)"right"
    :E=INKEY (200)
400 COLOUR 128
410 stack%=stack%+1
420 COLOUR 3
430 VDU 7
    :PRINT TAB(2,17)CHR$ (234)
    :E=INKEY (30)
440 FOR X%=12 TO 3STEP -1
450 PROCmanleft(X%,15)
460 NEXT
470 PROCmanready(3,15)
480 VDU 7
    :E=INKEY (50)
    :VDU 7
490 PRINT TAB(X%-2,17)"   "TAB(X%-2
    ,16)"   "TAB(X%-2,15)"   "
    :REM (3 spaces each time)
500 FOR X%=3 TO 12 STEP 1
510 PROCmanright(X%,15)
520 NEXT
530 PROCstack
540 PROCmanready(12,15)
550 FOR row=5TO 9
    :COLOUR 128
560 PRINT TAB(0,row)STRING$(18
    ," ")
    :NEXT
570 COLOUR 134
580 IF stack%=5
    THEN PROCendgood
590 IF 21-try%<=18-stack%
    THEN PROCendbad
600 UNTIL stack%=5
610 COLOUR 128
620 INPUT TAB(0,5)"another go""A$
630 IF LEFT$(A$,1)="Y"
    THEN 120
640 IF LEFT$(A$,1)="y"
    THEN 120
650 IF LEFT$(A$,1)="N"
    THEN 670
660 IF LEFT$(A$,1)="n"
    THEN 670
670 COLOUR 0
    :COLOUR 135
    :PRINT TAB(2,25)"goodbye"
680 END
690 REM ******
700 DEF PROCmanleft(X%,Y%)
710 SOUND 0,4,4,5
720 COLOUR 3
730 PRINT TAB(X%,Y%);CHR$ (224);
    TAB(X%,Y%+1);CHR$ (225);
    TAB(X%,Y%+2);CHR$ (226)
740 E=INKEY (10)
750 COLOUR 0
760 PRINT TAB(X%,Y%);CHR$ (224);
    TAB(X%,Y%+1);CHR$ (225);
    TAB(X%,Y%+2);CHR$ (226)
770 COLOUR 3
780 PRINT TAB(X%,Y%);CHR$ (224);
    TAB(X%,Y%+1);CHR$ (225);
    TAB(X%,Y%+2);CHR$ (227)
790 E=INKEY (10)
800 COLOUR 0
810 PRINT TAB(X%,Y%);CHR$ (224);
    TAB(X%,Y%+1);CHR$ (225);
    TAB(X%,Y%+2);CHR$ (227)
820 COLOUR 3
830 ENDPROC
840 REM ******
850 DEF PROCmanright(X%,Y%)
860 SOUND 0,4,4,5
870 COLOUR 3
880 PRINT TAB(X%,Y%);CHR$ (228)
    CHR$ (229)TAB(X%,Y%+1);CHR$ (230
    )CHR$ (231)TAB(X%,Y%+2)CHR$ (233
    )
890 E=INKEY (10)
900 COLOUR 0
910 PRINT TAB(X%,Y%);CHR$ (228)
    CHR$ (229)TAB(X%,Y%+1);CHR$ (230
    )CHR$ (231)TAB(X%,Y%+2)CHR$ (233)
920 COLOUR 3
930 PRINT TAB(X%,Y%);CHR$ (228)
    CHR$ (229)TAB(X%,Y%+1);CHR$ (230
    )CHR$ (231)TAB(X%,Y%+2)CHR$ (232)
940 E=INKEY (10)
950 COLOUR 0
960 PRINT TAB(X%,Y%);CHR$ (228)
    CHR$ (229)TAB(X%,Y%+1);CHR$ (230
    )CHR$ (231)TAB(X%,Y%+2)CHR$ (232
    )
970 COLOUR 3
980 ENDPROC
990 REM ******
```

→

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Seawall listing

From Page 155

```
1000 DEF PROCbench
1010 COLOUR 135
1020 FOR row=18 TO 29
1030 PRINT TAB(1,row)STRING$(14
     ," ")
1040 NEXT
1050 COLOUR 0
     :PRINT TAB(2,21)N$"'s go"
1060 COLOUR 128
     :COLOUR 7
1070 ENDPROC
1080 REM ******
1090 DEF PROCstack
1100 LOCAL S%
1110 FOR S%=1 TO stack%
1120 COLOUR 3
1130 PRINT TAB(12,15)CHR$ (228)
     TAB(12,16)CHR$ (230)TAB(12
     ,17)CHR$ (233)
1140 PRINT TAB(13,18-S%)CHR$ (234)
1150 SOUND 0,1,4,10
1160 E=INKEY (50)
1170 COLOUR 0
     :PRINT TAB(13,18-S%)CHR$ (234)
1180 PRINT TAB(12,15)" "
     :COLOUR 3
1190 PRINT TAB(12,16)CHR$ (235)
     TAB(12,17)CHR$ (236)
1200 E=INKEY (50)
1210 NEXT
1220 COLOUR 3
     :PRINT TAB(14,18-stack%)
     CHR$ (234)
1230 ENDPROC
1240 REM ******
1250 DEF PROCtitle
1260 SOUND 1,2,4,50
1270 COLOUR 3
     :COLOUR 129
1280 PRINT TAB(0,1)"add and subtract"
1290 COLOUR 7
     :COLOUR 128
1300 E=INKEY (450)
1310 ENDPROC
1320 REM ******
1330 DEF PROCmanready(X%,Y%)
1340 COLOUR 3
1350 PRINT TAB(X%,Y%);CHR$ (224);
     TAB(X%,Y%+1);CHR$ (225);
     TAB(X%,Y%+2);CHR$ (226)
1360 COLOUR 7
1370 ENDPROC
1380 REM ******
1390 DEF PROCadd
1400 PRINT TAB(0,5);A%" + "B%" =
     "
1410 ENDPROC
1420 REM ******
1430 DEF PROCsubtract
1440 PRINT TAB(0,5);C%" - "A%" =
     "
1450 ENDPROC
1460 REM ******
1470 DEF PROCaddans
1480 IF C%=ans
     THEN D%=1
     ELSE D%=0
1490 ENDPROC
1500 REM ******
1510 DEF PROCsubtractans
1520 IF B%=ans
     THEN D%=1
     ELSE D%=0
1530 ENDPROC
1540 REM ******
1550 DEF PROCintro
1560 CLS
     :PRINT
1570 PRINT "Add and subtract"
1580 PRINT "================"
     :PRINT
1590 PRINT "   Young Ben must build
      the sea wall"
     :PRINT "before the tide comes
      in."
1600 PRINT "   He needs five bricks
      to do this"
1610 PRINT "but the demon maths maste
      r will "
1620 PRINT "only provide him with
      bricks if he"
1630 PRINT "gets the answer right."
1640 PRINT "   If he makes too many
      mistakes the"
1650 PRINT "dreaded octopus will
      get him but if he"
1660 PRINT "succeeds the position
      is reversed."
1670 PRINT
     :PRINT "You can return to this
      page by pressing"
     :PRINT "ESCAPE"
1680 PRINT "Each answer typed in
      must be followed"
1690 PRINT "by pressing RETURN"
1700 PRINT
     :PRINT "Choose difficulty level.
      0 is easiest"
     :PRINT "higher numbers are incre
     asingly hard"
1710 INPUT L%
1720 PRINT "Type in your name (up
      to 8 letters)"
1730 INPUT N$
1740 ENDPROC
1750 REM ******
1760 DEF PROCsea
1770 COLOUR 6
     :COLOUR 128
1780 PRINT TAB(15,21-try%);CHR$ (237)
     ;CHR$ (247);CHR$ (237);CHR$ (247
     );CHR$ (237)
1790 FOR O%=22-try% TO 29
1800 COLOUR 134
1810 PRINT TAB(15,O%)STRING$(5,"
      ")
1820 NEXT
1830 PROCoctopus(16,22-try%)
1840 PROCwave(16,22-try%)
1850 COLOUR 7
     :COLOUR 128
1860 ENDPROC
1870 DEF PROCoctopus(I%,O%)
1880 COLOUR 0
     :COLOUR 134
1890 PRINT TAB(I%,O%);CHR$ (238)
     CHR$ (239)CHR$ (240)
1900 PRINT TAB(I%,O%+1);CHR$ (241)
     CHR$ (242)CHR$ (243)
1910 PRINT TAB(I%,O%+2);CHR$ (244)
     CHR$ (245)CHR$ (246)
1920 COLOUR 128
     :COLOUR 7
1930 ENDPROC
1940 REM ******
1950 DEF PROCwave(I%,O%)
1960 SOUND 0,-15,7,120
1970 SOUND 1,3,149,120
1980 SOUND 1,0,0,1
1990 FOR W=1 TO 30
2000 PRINT ;TAB(I%+1,O%);CHR$ (248);
     TAB(I%+1,O%+1);CHR$ (249)
2010 COLOUR 6
     :COLOUR 128
2020 PRINT TAB(15,21-try%);CHR$ (237)
     ;CHR$ (247);CHR$ (237);CHR$ (247
     );CHR$ (237)
2030 E=INKEY (5)
2040 PRINT TAB(15,21-try%);CHR$ (247)
     ;CHR$ (237);CHR$ (247);CHR$ (237
     );CHR$ (247)
2050 E=INKEY (5)
2060 COLOUR 0
     :COLOUR 134
```

→

Seawall listing

From Page 157

```
     :PRINT ; TAB(I%+1,O%);CHR$ (239)
     ;TAB(I%+1,O%+1);CHR$ (242)
2070 E=INKEY (8)
2080 NEXT W
2090 COLOUR 7
     :COLOUR 128
2100 ENDPROC
2110 REM ******
2120 DEF PROCendgood
2130 SOUND 1,2,4,50
2140 SOUND 1,0,0,1
2150 E=INKEY (250)
2160 COLOUR 128
     :PRINT ;TAB(12,15)" ";TAB(12
     ,16)" ";TAB(12,17)" "
2170 FOR M=4 TO 2 STEP -1
2180 VDU 19,3,0,0,0,0
     :COLOUR 134
2190 PROCmanready(14+M,23-try%)
2200 PROCmunch
2210 E=INKEY (350)
2220 COLOUR 134
2230 PRINT ;TAB(14+M,23-try%)" ";
     TAB(14+M,24-try%)" ";TAB(14+M
     ,25-try%)" "
2240 NEXT
2250 VDU 19,3,13,0,0,0
2260 COLOUR 128
2270 PROCmanready(10,15)
     :COLOUR 3
     :PRINT TAB(9,16);CHR$ (250);
     CHR$ (251)
2280 E=INKEY (200)
2290 ENDPROC
2300 REM ******
2310 DEF PROCmunch
2320 SOUND 0,-15,7,20
2330 SOUND 1,5,100,20
2340 SOUND 1,0,0,2
2350 FOR H=1 TO 7
2360 SOUND 0,0,5,5
2370 SOUND 0,-15+H,6,8
2380 NEXT
2390 ENDPROC
2400 REM ******
2410 DEF PROCendbad
2420 COLOUR 128
     :PRINT ;TAB(12,15)" ";TAB(12
     ,16)" ";TAB(12,17)" "
2430 COLOUR 6
2440 PRINT TAB(1,20-try%);STRING$(9
     ,CHR$ (247)+CHR$ (237));
     CHR$ (247)
2450 COLOUR 134
2460 FOR row=21-try% TO 29
2470 PRINT TAB(1,row)STRING$(19
     ," ")
2480 E=INKEY (3)
2490 NEXT
2500 FOR N=1 TO 3
2510 PROCmanready(11,25-(try%+N))
2520 PROCoctopus(10,22-try%)
2530 PROCmunch
2540 COLOUR 134
2550 E=INKEY (200)
2560 PRINT TAB(11,27-(try%+N))" "
2570 NEXT
2580 COLOUR 128
2590 stack%=5
2600 PROCoctopus(10,22-try%)
2610 E=INKEY (100)
2620 ENDPROC
2630 REM ******
2640 DEF PROCdefine
2650 REM ***brick***
2660 VDU 23,234,0,63,63,63,63,63
     ,63,63
2670 REM ***manleft***
2680 VDU 23,224,24,60,126,94,254
     ,110,14,126
2690 VDU 23,225,12,62,54,54,54,46
     ,94,62
2700 VDU 23,226,12,12,12,12,12,12
     ,124,124
2710 VDU 23,227,24,60,38,35,35,38
     ,36,228
2720 REM ***manright***
2730 VDU 23,228,24,60,126,122,127
     ,118,112,126
2740 VDU 23,229,63,63,63,63,63,63
     ,63,63
2750 VDU 23,230,48,124,127,124,124
     ,124,124,124
2760 VDU 23,231,63,63,225,0,0,0
     ,0,0
2770 VDU 23,232,24,60,100,196,196
     ,100,36,39
2780 VDU 23,233,24,24,24,24,24,24
     ,31,31
2790 REM ***manbendover***
2800 VDU 23,235,0,0,31,31,63,63
     ,63,63
2810 VDU 23,236,63,63,63,26,26,26
     ,26,63
2820 REM ***waves***
2830 VDU 23,237,16,24,60,126,255
     ,255,255,255
2840 VDU 23,247,0,0,0,0,0,129,195
     ,231
2850 REM ***octopus***
2860 VDU 23,238,0,0,1,3,7,15,31
     ,127
2870 VDU 23,239,225,255,255,126
     ,124,153,255,255
2880 VDU 23,240,0,128,192,224,240
     ,248,252,254
2890 VDU 23,241,255,255,255,255
     ,255,255,255,146
2900 VDU 23,242,255,126,36,0,255
     ,255,255,36
2910 VDU 23,243,255,255,255,255
     ,255,255,255,73
2920 VDU 23,244,146,146,146,146
     ,146,146,146,146
2930 VDU 23,245,36,36,36,36,36,36
     ,36,36
2940 VDU 23,246,73,73,73,73,73,73
     ,73,73
2950 REM ***octopusblink***
2960 VDU 23,248,225,255,255,255
     ,255,255,255,255,255
2970 VDU 23,249,255,255,255,255
     ,255,255,255,36
2980 REM ***manfat***
2990 VDU 23,250,0,15,127,255,247
     ,112,31,15
3000 VDU 23,251,12,255,231,207,159
     ,63,255,255
3010 REM ***envelopes***
3020 ENVELOPE 1,6,2,20,16,16,0,0
     ,126,0,0,-126,126,126
3030 ENVELOPE 2,2,6,0,0,255,0,0
     ,126,0,0,-126,126,126
3040 ENVELOPE 3,1,0,1,-1,0,100,100
     ,15,-15,0,0,126,40
3050 ENVELOPE 4,12,10,8,6,4,0,0
     ,126,0,0,-126,126,126
3060 ENVELOPE 5,1,-1,0,0,100,0,0
     ,1,1,0,0,5,5
3070 ENDPROC
3080 REM ************
3090 ON ERROR OFF
3100 MODE 7
3110 IF ERR =17
     THEN 3150
3120 PRINT "Error number "ERR
3130 PRINT "at line "ERL
3140 END
3150 RUN
```

This listing is included in this month's cassette tape offer. See order form on Page 181.

BBC MICRO USER

Deathwatch

and 24 other programs listed in the pages of BBC Micro User Vol. 1, No. 1.

March Issue

DEATHWATCH, a superb arcade game **BINGO**, clever uses of the randomise function; **BUBBLESORT** routines; **TESTS** function keys in machine code. 0.1 **COLOUR** and **GRAPHICS ROUTINES**: create a kaleidoscope of screen designs.

BBC MICRO USER

KING KONG

and 22 other programs listed in the pages of BBC Micro User Vol. 1, No. 2.

April Issue

KING KONG, rescue girls from the Empire State Building before killing Kong. **NIM**, a structural game of strategy. **TOKENS**, unravel the Basic ROM; **FORMATTER**, an essential disc utility; **DISASSEM**, a full machine code disassembler.

BBC MICRO USER

AIR STRIKE!

and 33 other programs listed in the pages of BBC Micro User Vol. 1, No. 3

May Issue

AIR STRIKE, a fast and furious arcade game; Test your mental powers with **PELMANISM**; **ANAGRAMS**, the word game. **CHARACTER**, generate vertical and inverted text. **TELETEXT**, animation in Mode 7. **BEEB**, two joystick exercises.

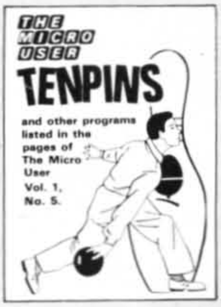
THE MICRO USER

SPACE PILOT

and other programs listed in the pages of BBC Micro User Vol. 1, No. 4.

June Issue

SPACE PILOT, lost in space you must fight off repeated attacks from alien life forms. **NOMISM**, you are a nomadic herdsman desperately trying to eke out a living on the plains of Africa. **COLOURFUL CHARACTERS PLUS** other listings from the June issue.

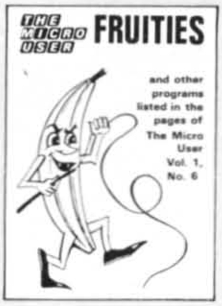

THE MICRO USER

TENPINS

and other programs listed in the pages of The Micro User Vol. 1, No. 5.

July Issue

TENPIN, a simulation of Tenpin Bowling; **SPACEPODS**, beat the alien hordes; **CUP**, Exciting 3D graphics techniques **TEST** and **STEADY**, programs to accompany the Beeb Body Building Course. **BREAKFIX**, Don't let Break destroy your precious variables!


THE MICRO USER FRUITIES

and other programs listed in the pages of The Micro User Vol. 1, No. 6

August Issue

FRUITIES, driven by strange urges you climb the ladders of adventure to risk all in the gardens of unearthly frights. **ANIMATION**, a suite of programs that really bring your screen alive; **CASDISC**, the machine code downloader for your disc system; **MODE 7** colour routines.

THE MICRO USER

Robin and Marian

and other programs listed in the pages of The Micro User Vol. 1, No. 7

September Issue

ROBIN & MARIAN, rescue Maid Marian from the Sheriff of Nottingham. **GALACTIC INVADERS**, an exciting arcade game. **DFS BENCHMARKS**, 14 DFS test programs. **ANIMATION**, new techniques. **TERMINAL**, connect a BBC Micro to a mainframe.

THE MICRO USER GONE FISHIN'

and other programs listed in the pages of The Micro User Vol. 1, No. 8

October Issue

FISHING, a compulsive day's angling. **JOYKEY**, convert programs to joystick. **PENTEST** and **BELLRINGER**, for Micro User light pens. **CONTOURS**, an educational program. **LINK** BBC Micros to each other. **PLUS** all the listings from the first Electron User.

THE MICRO USER

Goblins and Blackjack

and other programs listed in the pages of The Micro User Vol. 1, No. 9

November Issue

GOBLINS, an enchanted journey. **BLACKJACK**, the casino favourite. **CHARGE** and **PENDULUM**, Body Building Course part 9. **SIDEWAYS**: programs in ROMs. **PENDRAW**, a light pen sketching program. **PLUS** all the programs from the second Electron User.

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ORDER FORM ON PAGE 181

THE MICRO USER

Tower Bridge

and other programs listed in the pages of the Micro User Vol. 1, No. 10

December Issue

TOWER, rescue London's treasure **SANTA**, help Father Christmas deliver his presents. **VDU 23**, an invaluable character defining utility. **PAGED**, the listing from our paged graphics article. **PLUS** all the listings from the third issue of Electron User.

THE MICRO USER

Barrel Battle

and other programs listed in the pages of the Micro User Vol. 1, No. 11

January Issue

BARRELS, an all-action arcade game. **NOTEPLAY**, an entertaining musical utility. **DUMP1** and **DUMP2**, multitone screen dumps. All the programs from our **SOUND**, **BEGINNERS'** and **GRAPHICS** articles **PLUS** 12 programs from the fourth Electron User.

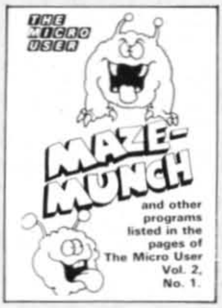
THE MICRO USER

ALIEN INVASION

and other programs listed in the pages of the Micro User Vol. 1, No. 12

February Issue

INVASION, the classic arcade game. **FROGS**, fun for all the family. **ENGVGEN**, a logic game. **BALANCE**, a number learning program. **KEY**, single key entry for the BBC Micro **PLUS** nine other programs from The Micro User.


THE MICRO USER

MAZE-MUNCH

and other programs listed in the pages of The Micro User Vol. 2, No. 1.

March Issue

MAZEMUNCH, blockbusting arcade action. **BIRTHDAY**, family fun for our anniversary. **DERRICK**, number fun for infants. **PIXELPEN**, high resolution for lightpens. **LOADTAPE**, a recovery utility. **PLUS** 18 other programs from the pages of Micro User.

THE MICRO USER

Micro golf

and other programs listed in the pages of The Micro User Vol. 2, No. 2.

April Issue

MICROGOLF, the simulation. **EASTERMAZE** and **APRIL FOOL**, seasonal games. **SEAWALL** and **MAGIC SQUARE**, maths fun. **FILER** and **ALBUM**, a database of sounds. **TRX1**, **TRX2**, RS243 driver. **HEARTRATE**, monitor your fitness.

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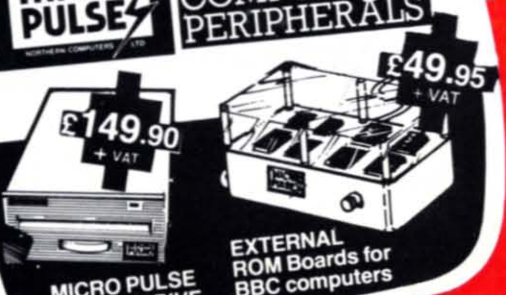

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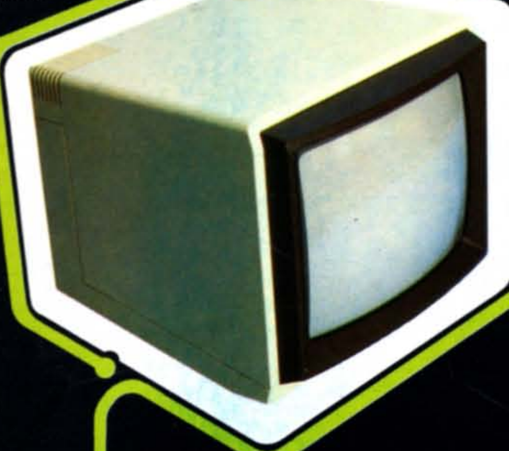

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Easter Maze listing

From Page 89

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of The Micro User.

```
 10 H%=30
    :S%=0
    :J%=0
    :MODE 2
    :VDU 23;8202;0;0;0;
    :PROCINIT
    :PROCCHARS
 20 CLEAR
    :MODE 7
    :VDU 23;8202;0;0;0;
 30 PROCINIT
    :MODE 2
    :VDU 23;8202;0;0;0;
    :PROCSCREEN
    :DEL%=0
    :BO%=0
    :REPEAT
    :PROCMOVE
    :PROCMOVE
    :PROCRABBITSMOVE
    :PROCCHECK
    :PROCMOVE
    :PROCRABBITSMOVE
    :PROCCHECK
    :BO%=BO%+1
    :IF BO%=4 BO%=0
 40 UNTIL LI%=0
    :MODE 7
    :PROCSCORE
 50 *FX12
 60 CLS
    :A$=FNANS
    :IF A$="Y" GOTO 20
    ELSE CLS
    :VDU 7
    :END
 70 DEF PROCINIT
    :*FX11,1
 80 *FX12,4
 90 VDU 23,224,0,0,255,0,0,255,0
    ,0,23,225,36,36,36,36,36,36
    ,36,36,23,226,0,0,24,36,36,36
    ,36,36,23,227,0,0,31,32,32,31
    ,0,0,23,228,36,36,36,36,36,24
    ,0,0,23,229,0,0,248,4,4,248
    ,0,0,23,230,0,0,15,16,32,35
    ,36,36,23,231,0,0,240,8,4,196
    ,36,36
100 VDU 23,232,36,36,196,4,8,240
    ,0,0,23,233,36,36,35,32,16,15
    ,0,0,23,234,28,28,8,62,93,93
    ,20,54,23,235,20,20,62,42,20
    ,20,20,54,23,236,0,0,20,20,42
    ,62,20,54,23,237,0,0,0,6,4,15
    ,30,60,23,238,100,108,252,124
    ,60,24,16,24,23,239,24,24,60
    ,60
110 VDU 60,60,126,126,23,240,126
    ,126,126,126,60,60,0,0,23,241
    ,0,48,124,127,124,48,0,0
    :P$=CHR$ (234)
    :DIM W$(9),A$(24),R$(1)
    :FOR A%=0TO 9
    :W$(A%)=CHR$ (A%+224)
    :NEXT
    :A$(0)=W$(6)+STRING$(18,W$(0))+W$
    (7)
    :A$(1)=W$(1)+STRING$(18," ")+W$(1)
120 T$=" "+W$(6)+W$(0)+W$(7)+" "
    :R$(0)=CHR$ 235
    :R$(1)=CHR$ 236
    :M$=" "+W$(1)+" "+W$(1)+" "
130 B$=" "+W$(9)+W$(0)+W$(8)+" "
    :A$(2)=W$(1)+T$+W$(6)+W$(0)+W$(5)
    +"  "+W$(3)+W$(0)+W$(7)+T$+W$(1)
    :A$(3)=W$(1)+M$+W$(1)+"
     "+W$(1)+M$+W$(1)
    :A$(4)=W$(1)+B$+W$(1)+" "+W$(2)+
    "  "+W$(2)+" "+W$(1)+B$+W$(1)
140 A$(5)=W$(1)+"     "+W$(4)+" "+W$(
    9)+W$(0)+W$(0)+W$(8)+" "+W$(4)+
    "     "+W$(1)
    :A$(6)=W$(1)+T$+"        "+T$+W$(
    1)
    :A$(7)=W$(1)+M$+W$(2)+" "+W$(6)+W
    $(0)+W$(0)+W$(7)+" "+W$(2)+M$+W$(
    1)
    :A$(8)=W$(1)+B$+W$(1)+" "+W$(1)+
    "  "+W$(1)
150 A$(8)=A$(8)+" "+W$(1)+B$+W$(1)
    :A$(9)=W$(1)+"     "+W$(1)+"
     "+W$(9)+W$(0)+W$(0)+W$(8)+"
     "+W$(1)+"     "+W$(1)
    :A$(10)=W$(1)+T$+W$(1)+"
      "+W$(1)+T$+W$(1)
    :A$(11)=W$(1)+M$+W$(9)+W$(0)+W$(5
    )+"  "+W$(3)+W$(0)+W$(8)+M$+W$(1)
160 A$(12)=W$(1)+M$+STRING$(8," ")+M$
    +W$(1)
    :A$(13)=W$(1)+M$+W$(6)+W$(0)+W$(5
    )+"  "+W$(3)+W$(0)+W$(7)+M$+W$(1)
    :A$(14)=W$(1)+B$+W$(1)+"
      "+W$(1)+B$+W$(1)
    :A$(15)=W$(1)+"     "+W$(1)+
    " "+W$(6)+W$(0)+W$(0)+W$(7)+
    " "+W$(1)+"     "+W$(1)
170 A$(16)=W$(1)+T$+W$(1)+" "+W$(1)+
    "  "+W$(1)+" "+W$(1)+T$+W$(1)
    :A$(17)=W$(1)+M$+W$(4)+" "+W$(9)+
    W$(0)+W$(0)+W$(8)+" "+W$(4)+M$+W$
    (1)
    :A$(18)=W$(1)+B$+"        "+B$+W$
    (1)
180 A$(19)=W$(1)+"     "+W$(2)+"
     "+W$(6)+W$(0)+W$(0)+W$(7)+"
     "+W$(2)+"     "+W$(1)
    :A$(20)=W$(1)+T$+W$(1)+" "+W$(4)+
    "  "+W$(4)+" "+W$(1)+T$+W$(1)
    :A$(21)=W$(1)+M$+W$(1)+"
      "+W$(1)+M$+W$(1)
190 A$(22)=W$(1)+B$+W$(9)+W$(0)+W$(5)
    +"  "+W$(3)+W$(0)+W$(8)+B$+W$(1)
    :A$(23)=W$(1)+STRING$(18," ")+W$(
    1)
    :A$(24)=W$(9)+STRING$(18,W$(0))+W
    $(8)
    :L%=0
    :DIM RX%(7),RY%(7)
    :X%=8+RND(2)
    :Y%=12
    :FOR A%=0TO 7STEP 2
    :RX%(A%)=(A%+1)*2
    :RY%(A%)=1
200 RX%(A%+1)=(19-((A%+1)*2))
    :RY%(A%+1)=23
    :NEXT
    :S%=0
    :LI%=3
    :DIM B%(3)
    :FOR A%=0TO 3
    :B%(A%)=TRUE
    :NEXT
    :E%=1280
    :XD%=0
    :YD%=1
    :EGG%=4
    :EGG$=CHR$ 239+CHR$ 10+CHR$ 8+
    CHR$ 240
    :SPA$=" "+CHR$ 10+CHR$ 8+" "
    :FE%=0
    :FX%=0
    :FY%=0
    :CARRY%=0
    :DROP$=CHR$ 17+CHR$ 3
    :SL%=0
210 CHICK$=CHR$ 237+CHR$ 10+CHR$ 8+
    CHR$ 238+CHR$ 11
    :ENDPROC
220 DEF PROCMOVE
    :PROCCLEAR
    :PROCFREEZE
    :IF E%<4 SOUND 1,-15,1,1
```

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Easter Maze listing

From Page 163

```
    :ENDPROC
230 IF E%<500 SOUND 1,-E%MOD 120/16
    ,E%/2,1
240 IF X%>8AND X%<11AND Y%=12
    AND CARRY%=-1 CARRY%=0
    :E%=E%+50
    :S%=S%+5
    :PROCTEXT
    :FOR A%=-15TO 0
    :SOUND 0,A%,2,2
    :TIME =0
    :REPEAT UNTIL TIME >10
    :NEXT
    :IF E%>1280 E%=1280
250 COLOUR 5
    :E%=E%+1
    :MOVE E%DIV 16*16,164
    :DRAW E%DIV 16*16,186
    :IF INKEY (-82)OR INKEY (-68)
     PROCEASYDIF
260 IF INKEY (-73)AND FNPOINT(X%
    ,Y%-1)=" " PROCUP
270 IF INKEY (-105)AND FNPOINT(X%
    ,Y%+1)=" " PROCDOWN
280 IF INKEY (-98)AND FNPOINT(X%-1
    ,Y%)=" " PROCLEFT
290 IF INKEY (-67)AND FNPOINT(X%+1
    ,Y%)=" " PROCRIGHT
300 IF X%=10R X%=18 PROCEGGS
310 PROCPEGGS
    :IF EGG%=0AND CARRY%=0 PROCNSHEET
320 IF CARRY% COLOUR 7
    :PRINT TAB(11,27);EGG$
    ELSE PRINT TAB(11,27);SPA$
330 IF SL%PROCSLOW
    :PRINT TAB(8,31);"SLOW";
    ELSE PRINT TAB(8,31);"FAST";
340 PROCPFEED
    :I$=INKEY$ (0)
    :IF I$=" "AND FE%=0 PROCFEED

    ELSE IF I$=" " PRINT TAB(FX%
    ,FY%);" "
    :PROCFEED
350 ENDPROC
360 DEF PROCSCREEN
370 COLOUR 128
    :COLOUR 2
    :CLS
    :FOR B%=0TO 24
    :PRINT A$(B%);
    :NEXT
    :COLOUR 132
    :COLOUR 128
    :PROCTEXT
    :COLOUR 128
    :COLOUR 5
    :PRINT TAB(X%,Y%);P$
    :ENDPROC
380 DEF FNPOINT(A%,B%)
    :=MID$(A$(B%),A%+1,1)
390 DEF PROCTEXT
    :COLOUR 0
    :COLOUR 130
    :PRINT TAB(0,25);'STRING$(20
    ," ")
    :COLOUR 128
    :COLOUR 14
    :PRINT TAB(0,28);"  ENERGY"
    :COLOUR 1
    :COLOUR 128
    :PRINT TAB(0,29);" LIVES ";LI%'
    " SCORE ";S%;TAB(14,29);DROP$
    :GCOL 0,4
400 FOR Z%=1280TO E%-10STEP -16
    :MOVE Z%,164
    :DRAW Z%,186
    :NEXT
    :ENDPROC
410 DEF PROCSPC
    :COLOUR 128
    :PRINT TAB(X%,Y%);" "
    :E%=E%-4
    :ENDPROC
420 DEF PROCCHECK
    :IF TRU%=TRUE
    THEN PROCSPLAT
430 ENDPROC
440 DEF PROCRABBITSMOVE
    :TRU%=FALSE
450 FOR A%=0TO L%
    :PRINT TAB(RX%(A%),RY%(A%));
    " "
    :SGX%=0
    :IF FE% PROCSTOPRABBIT
    :IF NEX% GOTO 490
460 SGY%=RY%(A%)+SGN (Y%-RY%(A%))
    :IF FNRABPOINT(RX%(A%),SGY%)
     RY%(A%)=SGY%
470 SGX%=RX%(A%)+SGN (X%-RX%(A%))
    :IF FNRABPOINT(SGX%,RY%(A%))
     RX%(A%)=SGX%
480 IF X%=RX%(A%)AND Y%=RY%(A%)
     TRU%=-1
490 COLOUR 4
    :COLOUR 128
    :PRINT TAB(RX%(A%),RY%(A%));R$(BO
    %DIV 2)
    :NEXT
    :E%=E%-1
    :IF E%<-40 TRU%=-1
500 ENDPROC
510 DEF FNANS
    :PRINT "Another Game ?
                               Y or N"
    :REPEAT
    :A$=GET$
    :UNTIL INSTR("YN",A$)
    :=A$
520 DEF PROCSPLAT
    :COLOUR RND(3)+1
    :FOR Z%=0TO 50
    :PRINT TAB(X%,Y%);CHR$ (RND(5)+32
    )
    :SOUND 0,-15,4,1
    :NEXT
    :E%=1280
    :*FX15
530 LI%=LI%-1
    :X%=8+RND(2)
    :Y%=12
    :FOR Z%=0TO 7STEP 2
    :RX%(Z%)=(Z%+1)*2
    :RY%(Z%)=1
    :RX%(Z%+1)=(19-((Z%+1)*2))
    :RY%(Z%+1)=23
    :NEXT
    :PROCSCREEN
    :FE%=0
    :ENDPROC
540 DEF PROCSCORE
    :IF S%>H% PRINT '''CHR$ 138;
    "            CONGRATULATIONS
     !"'"          You have the high
     score !"
    :H%=S%
550 PRINT ''''CHR$ (136);CHR$ (129);
    "              HIGH   SCORE"''
    CHR$ (133);STRING$(19-(LEN (
    STR$ (H%))DIV 2)," ");H%;'''''
    "            Your score was ";S%;'
    '''''''"                 Press any
     key"
    :G=GET
    :ENDPROC
560 DEF FNRP(X%,Y%)
    :IF L%=0 =0
570 IF POINT(X%*64+24,1024-(Y%*32)-28
    )=4 =-1
    ELSE =0
580 DEF FNRABPOINT(RX%,RY%)
    :IF FNRP(RX%,RY%)=0 AND FNPOINT(R
    X%,RY%)=" " =-1
    ELSE =0
590 DEF PROCT
    :PROCSCREEN
    :E%=E%+100+RND(100)*2
    :PROCTEXT
    :ENDPROC
600 DEF PROCUP
    :PROCSPC
    :Y%=Y%-1
    :E%=E%-1
    :PRINT TAB(X%.Y%);P$
```

→

Easter Maze listing

From Page 165

```
    :XD%=0
    :YD%=-1
    :ENDPROC
610 DEF PROCDOWN
    :PROCSPC
    :Y%=Y%+1
    :E%=E%-1
    :PRINT TAB(X%,Y%);P$
    :XD%=0
    :YD%=1
    :ENDPROC
620 DEF PROCLEFT
    :PROCSPC
    :X%=X%-1
    :E%=E%-1
    :PRINT TAB(X%,Y%);P$
    :XD%=-1
    :YD%=0
    :ENDPROC
630 DEF PROCRIGHT
    :PROCSPC
    :X%=X%+1
    :E%=E%-1
    :PRINT TAB(X%,Y%);P$
    :XD%=1
    :YD%=0
    :ENDPROC
640 DEF PROCNSHEET
    :L%=L%+1
    :S%=S%+5
    :FOR A%=0TO 3
    :B%(A%)=-1
    :NEXT
    :FOR A%=0TO 255STEP 2
    :SOUND 1,-15,A%,0
    :NEXT
    :X%=RND(2)+8
    :Y%=12
    :FOR Z%=0TO 7STEP 2
    :RX%(Z%)=(Z%+1)*2
    :RY%(Z%)=1
    :RX%(Z%+1)=(19-((Z%+1)*2))
    :RY%(Z%+1)=23
650 NEXT
    :DROP$=CHR$ 17+CHR$ 3
    :EGG%=4
    :E%=1280
    :PROCT
    :IF L%=8 L%=7
    :ENDPROC
    ELSE ENDPROC
660 DEF PROCPEGGS
    :COLOUR 128
    :COLOUR 7
    :IF B%(0) PRINT TAB(1,1);EGG$
670 IF B%(1) PRINT TAB(1,22);EGG$
680 IF B%(2) PRINT TAB(18,1);EGG$
690 IF B%(3) PRINT TAB(18,22);EGG$
700 ENDPROC
710 DEF PROCEGGS
    :IF CARRY% ENDPROC
720 IF X%=1AND Y%=1AND B%(0) B%(0)=0
    :S%=S%+15
    :EX%=1
    :EY%=2
    :E%=E%+100
    :EGG%=EGG%-1
    :PROCTTEXT
    :IF E%>1280 E%=1280
    ELSE IF X%=1AND Y%=23AND B%(1)
     B%(1)=0
    :S%=S%+15
    :EX%=1
    :EY%=22
    :E%=E%+100
    :EGG%=EGG%-1
    :PROCTTEXT
    :IF E%>1280 E%=1280
730 IF X%=18AND Y%=1AND B%(2) S%=S%+1
    5
    :B%(2)=0
    :EX%=18
    :EY%=2
    :E%=E%+100
    :EGG%=EGG%-1
    :PROCTTEXT
    :IF E%>1280 E%=1280
    ELSE IF X%=18AND Y%=23AND B%(3)
     S%=S%+15
    :B%(3)=0
    :EX%=18
    :EY%=22
    :E%=E%+100
    :EGG%=EGG%-1
    :PROCTTEXT
    :IF E%>1280 E%=1280
740 ENDPROC
750 DEF PROCTTEXT
    :PROCTEXT
    :COLOUR 128
    :PRINT TAB(EX%,EY%);" "
    :CARRY%=-1
    :DROP$=DROP$+CHICK$
    :FOR A%=0TO 255STEP 25
    :SOUND 1,-15,A%,1
    :NEXT
    :ENDPROC
760 DEF PROCFREEZE
    :IF INKEY (-56)=0 ENDPROC
770 PRINT TAB(8,31);"PAUSE";
    :FOR A=0TO 1000
    :NEXT
    :REPEAT
    :UNTIL INKEY (-56)
    :PRINT TAB(8,31);"     ";
    :ENDPROC
780 DEF PROCEASYDIF
    :IF INKEY (-82) SL%=-1
    ELSE SL%=0
790 ENDPROC

800 DEF PROCSLOW
    :FOR A=0TO 300
    :NEXT
    :ENDPROC
810 DEF PROCFEED
    :FX%=X%
    :FY%=Y%
    :FE%=-1
    :ENDPROC
820 DEF PROCPFEED
    :IF FE%=0 ENDPROC
830 COLOUR 1
    :PRINT TAB(FX%,FY%);CHR$ 241
    :ENDPROC
840 DEF PROCSTOPRABBIT
    :IF RX%(A%)<>FX%OR RY%(A%)<>FY%
     NEX%=0
    :ENDPROC

850 IF RND(9)=1 FE%=0
    :PRINT TAB(FX%,FY%);" "
    :ENDPROC
860 NEX%=-1
    :S%=S%+2
    :ENDPROC
870 DEF PROCCHARS
    :COLOUR 5
    :PRINT ''''P$;" - Y o u"''
    :COLOUR 4
    :PRINT R$(0);" - R a b b i t"''
    :COLOUR 7
    :PRINT EGG$;" - E g g"''
    :COLOUR 2
    :PRINT CHICK$;" - C h i c k"''
    :COLOUR 1
    :PRINT CHR$ 241;" - C a r r o
     t"
880 PRINT TAB(0,30);"P r e s s  S
     P A C E"
    :REPEAT UNTIL INKEY (-99)
    :*FX15
890 ENDPROC

900 DEF PROCCLEAR
    :*FX15
910 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 181.

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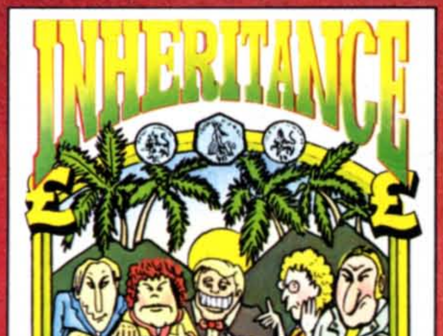
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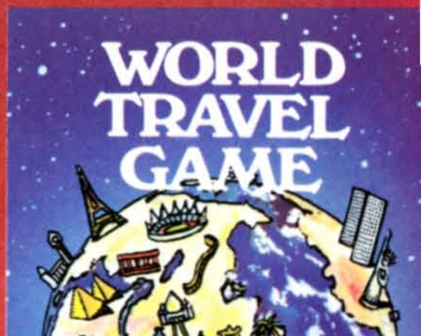
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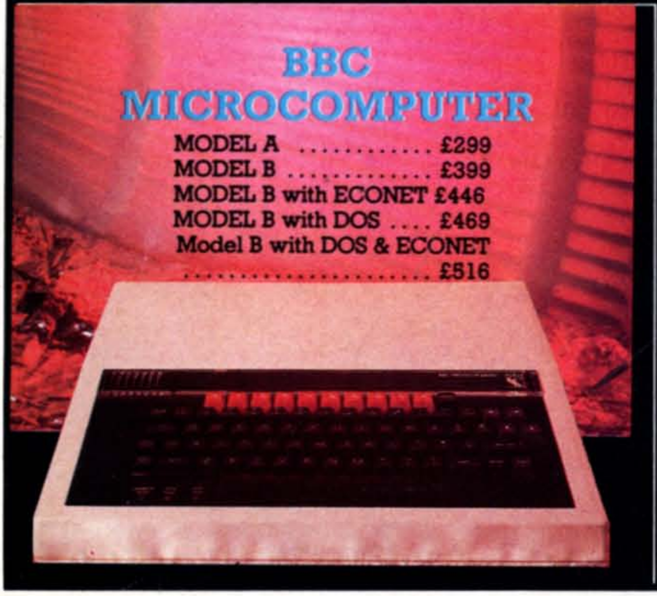

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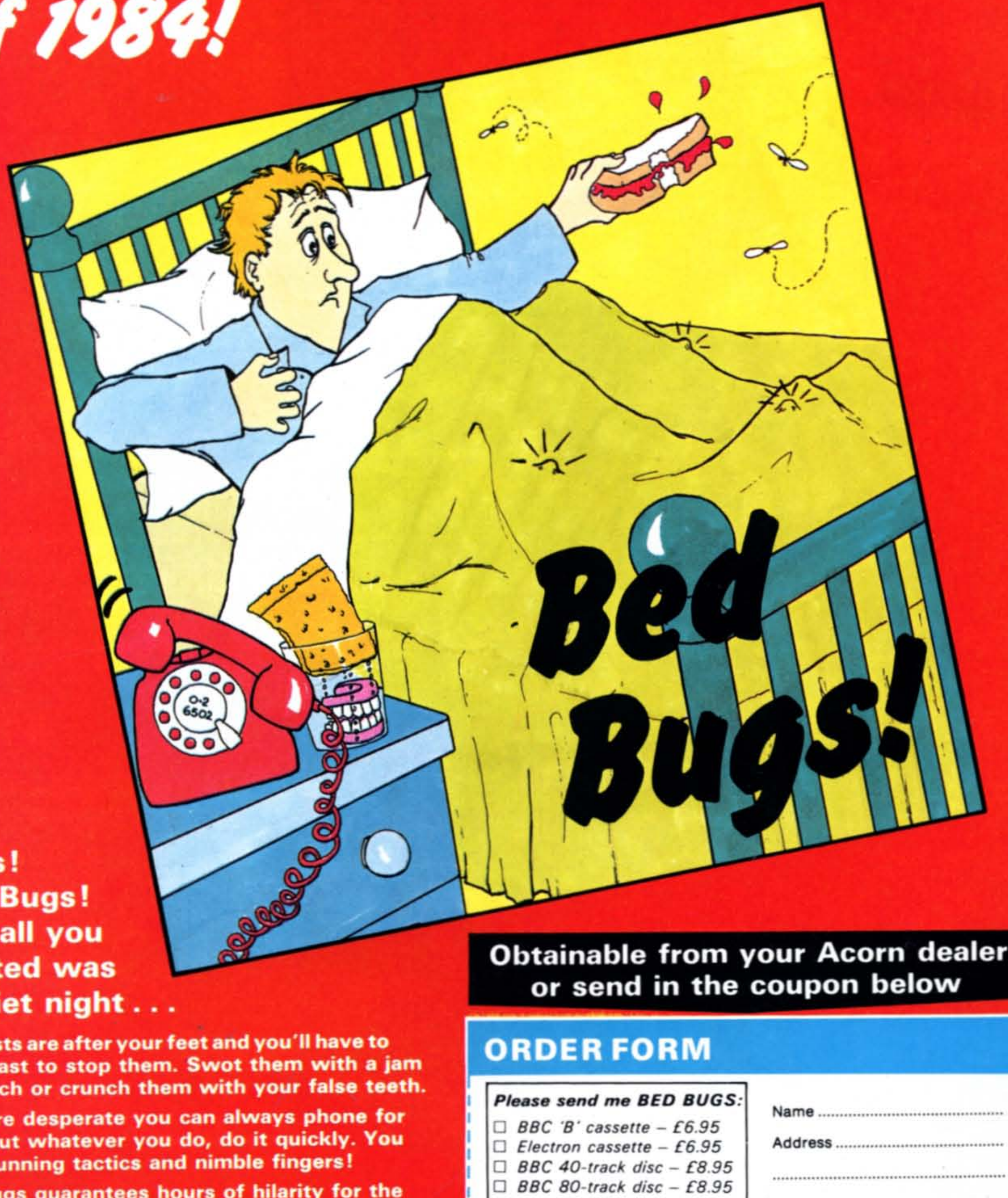

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```
  220IF G%=0 THEN PROChoriz ELSE VDU 2
8,0,1,19,0
  230S%=S%+1
  240VDU 4
  250PRINT'"   Shots=";S%
  260PRINT TAB(0,1);"direction 0-360";
  270INPUT D,""
  280PRINT 'TAB(0,1);A$;
  290INPUT C
  300IF PO%=0 THEN C=C/2
  310PRINT '"   Shots=";S%
  320IF C<1 OR C>30 THEN VDU7:GOTO 280
  330XB1=SIN(RAD(D))*4
  340XB2=ABS(SIN(RAD(D))*4)
  350YB1=COS(RAD(D))*4
  360B=200/(C*7)
  370IF G%=1 THEN 460
  380CX%=2000:CY%=2000
  390VDU 24,0;0;1276;100;
  400IF G%=0 THEN PROCgolfer
  410VDU 24,0;0;1276;1020;
  420PL%=X-100
  430X10=X
  440VDU5
  450:
  460FOR Q%=1 TO C*7
  470J%=SIN(RAD(Q%*B))*60+8
  480IF J%<16 THEN J%=16
  490SOUND 2,-10,J%*2.3,1
  500GCOL 3,15
  510MOVE X10-PL%,J%+24:VDU 5,235,4
  520VDU5
  530MOVE X,Y
  540VDU 235
  550VDU4
  560X=X+XB1
  570X10=X10+XB2
  580Y=Y+YB1
  590PO%=POINT(X+32+XB1*2,Y-16+YB1*2)
  600GCOL 3,15
  610VDU5
  620MOVE X,Y
  630VDU 235,4
  640GCOL 3,15
  650MOVE X10-PL%-XB2,J%+24:VDU 5,235,
4
  660IF PO%=8 THEN Q%=C*7
  670IF PO%=-1 THEN Q%=C*7:MOVE X-XB1,
Y-YB1:VDU 5,235,4
  680IF PO%=3 AND J%<55 THEN Q%=C*7:EN
VELOPE 2,1,128,124,120,20,20,20,127,0,
0,-2,126,126:SOUND 2,2,0,10:PRINT "dro
p a shot":S%=S%+1
  690NEXT
  700A=INKEY(100)
  710IF X+32>XG% AND X+32<XG%+150 AND
Y-16>YG% AND Y-16<YG%+150 THEN PROCgre
en
  720ENDPROC
  730:
  740:
  750DEF PROCsetup
  760RESTORE 790
  770FOR Q%=1 TO 11
  780READ W,E:VDU 19,W,E,0,0,0:NEXT
  790DATA 14,7,3,2,5,3,1,6,4,1,10,7,9,
7,11,7,12,7,13,7,15,7
  800VDU 23,235,0,16,56,56,56,16,0,0
  810ENVELOPE 2,7,132,124,7,30,30,50,1
27,0,0,-2,126,126
  820SOUND 2,2,100,45
  830VDU 28,0,1,19,0
  840X=68:Y=528:PO%=6:P1%=6
  850A$="Club <0-30>"
  860G%=0:MX%=2000:MY%=2000
  870XG%=RND(400)+630:YG%=RND(580)+164
  880REM ** Fill in background **
  890PROCsqu(0,0,1276,96,0)
  900GCOL 0,1
  910MOVE 0,96:DRAW 1276,96
  920GCOL 0,128
  930PROCdrfarway
  940REM ** Draw green **
  950PROCsqu(XG%-16,YG%-16,XG%+166,YG%
+166,0)
  960PROCsqu(XG%,YG%,XG%+150,YG%+150,2
)
  970REM ** Draw teeing off area **
  980PROCsqu(34,449,166,581,0)
  990PROCsqu(50,465,150,565,5)
 1000REM ** Draw ball **
 1010GCOL 3,15
 1020MOVE X,Y
 1030VDU 5,235
 1040VDU 4
 1050REM ** Draw hole **
 1060XH%=RND(100)+25:YH%=RND(100)+25
 1070PROCsqu(XH%+XG%,YH%+YG%,XH%+8+XG%
,YH%+8+YG%,15)
 1080VDU5
 1090MOVE XH%-16+XG%,YH%+40+YG%
 1100GCOL 0,11
 1110VDU 225
 1120FOR Q%=2 TO RND(8)
 1130MOVE XG%-64-RND(400),RND(150)+YG%
 1140GCOL 0,3
 1150VDU 231,10,8,232
 1160VDU 11,8,229,10,8,230
 1170NEXT
 1180VDU 4
 1190ENDPROC
 1200:
 1210:
 1220DEF PROCsqu(O%,I%,U%,T%,C%)
 1230VDU 24,O%;I%;U%;T%;
 1240GCOL 0,C%+128
 1250CLG
 1260VDU 24,0;96;1276;956;
 1270ENDPROC
 1280:
 1290:
 1300DEF PROCgreen
 1310ENVELOPE 2,2,-2,1,128,75,150,100,
127,0,0,-1,126,126
 1320SOUND 2,2,0,75
 1330G%=1
 1340VDU 24,0;0;1276;1020;
 1350A$="Power of hit 0-30"
 1360VDU 19,1,2,0;0
 1370GCOL 0,128
 1380CLG
 1390PROCsqu(100,100,850,850,1)
 1400PROCsqu(100+XH%*5,100+YH%*5,132+X
H%*5,132+YH%*5,8)
 1410X=(X+32-XG%)*5+100:Y=(Y-YG%)*5+10
0
 1420GCOL 3,15
 1430MOVE X,Y:VDU 5,235,4
 1440ENDPROC
 1450:
 1460:
 1470DEF PROChoriz
 1480VDU 26
 1490PROCsqu(0,0,1276,96,0)
 1500GCOL 0,7
 1510MOVE 0,96:DRAW 1276,96
 1520VDU 26
 1530XB=X:YB=Y
 1540XL%=(XH%+8+XG%)-XB:YL%=(YH%+8+YG%
)-YB
 1550L%=SQR(XL%^2+YL%^2)
 1560IF S%=0 THEN H(HO%+1,1)=L%
 1570FOR Q%=100 TO L%+100+(150-XH%) ST
EP 8
 1580PO%=POINT(XB,YB)
 1590GCOL 0,PO%
 1600IF PO%=3 THEN MOVE Q%,76:GCOL 0,3
:VDU 5,231,10,8,232:VDU 11,8,229,10,8,
230,4
 1610IF PO%=15 THEN Q%=Q%-16:VDU 5:MOV
E Q%,32::GCOL 0,12:VDU 226:VDU 4:Q%=L%
+100+(150-XH%):GOTO 1670
 1620IF PO%=3 THEN WE%=Q%:GCOL 0,1:FOR
 Q%=WE% TO WE%+64 STEP 8
 1630PLOT 69,Q%,12
 1640PLOT 69,Q%,8
```

→

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```
 1650XB=XB+((XL%/L%)*8):YB=YB+((YL%/L%
)*8)
 1660IF PO%=3 THEN NEXT Q%:Q%=Q%-8
 1670NEXT
 1680VDU 28,0,1,19,0
 1690ENDPROC
 1700:
 1710:
 1720DEF PROCdoneit
 1730VDU 23;8202;0;0;0;
 1740HO%=HO%+1
 1750ENVELOPE2,3,5,64,-5,30,30,30,127,
0,0,-1,100,100
 1760SOUND 2,2,0,100
 1770VDU26
 1780B$="th"
 1790IF HO%=1 THEN B$="st"
 1800IF HO%=3 THEN B$="rd"
 1810IF HO%=2 THEN B$="nd"
 1820FOR Q%=10 TO 11
 1830PRINT TAB(10,Q%);CHR$129;CHR$141;
"CONGRATULATIONS"
 1840PRINT TAB(2,Q%+4);CHR$130;CHR$141
;"You did the ";HO%;B$;" hole in ";S%;
" shots"
 1850NEXT
 1860H(HO%,0)=S%
 1870PROCd
 1880S%=0
 1890ENDPROC
 1900:
 1910:
 1920DEF PROCcharset
 1930RESTORE 2000
 1940FOR Q%=225 TO 234
 1950READ Q,W,E,R,T,Y,U,I
 1960VDU 23,Q%,Q,W,E,R,T,Y,U,I
 1970NEXT
 1980ENDPROC
 1990REM ** Character data **
 2000DATA 16,24,28,24,16,16,16,16,12,1
4,12,8,8,235,42,62
 2010DATA 0,60,126,60,24,60,126,126,12
6,126,126,102,102,102,231,231
 2020DATA 0,0,0,0,36,102,231,36,102,23
1,36,102,231,0,0,0,0,0,0,24,24,24,24,2
4,24,24,24,24,24,24,24,24
 2030DATA 0,0,0,36,60,24,24,24,0,24,24
,0,0,0,0,0
 2040:
 2050:
 2060DEF PROCdrclub(KX%,KY%,K)
 2070GCOL 3,15
 2080MOVE MX%+32,MY%-32
 2090DRAW MX%+KX%,MY%+KY%
 2100GOTO 2130
 2110MOVE MX%+KX%*COS(RAD(-20))-KY%*SI
N(RAD(-20)),MY%+KX%*SIN(RAD(-20))+KY%*
COS(RAD(-20))
 2120PLOT 85,MX%+KX%*0.8,MY%+KY%*0.8
 2130ENDPROC
 2140:
 2150:
 2160DEF PROCgolfer
 2170MX%=86:MY%=76
 2180VDU 24,0;0;1276;1020;
 2190VDU5
 2200GCOL 0,4
 2210MOVE MX%,MY%
 2220VDU 227
 2230MOVE MX%,MY%-32
 2240VDU 228
 2250VDU 4,28,0,1,19,0
 2260MOVE MX%,MY%
 2270CX%=0:CY%=0
 2280PROCdrclub(CX%,CY%,2)
 2290FOR Q%=0 TO 360 STEP 18
 2300PROCdrclub(CX%,CY%,2)
 2310CX%=COS(RAD(Q%+90))*40+32
 2320CY%=SIN(RAD(Q%+90))*40-32
 2330PROCdrclub(CX%,CY%,1)
 2340NEXT
 2350ENDPROC
 2360:
 2370:
 2380DEF PROCintro
 2390VDU 23;8202;0;0;0;
 2400ENVELOPE 1,1,1,1,3,10,15,10,127,0
,0,-5,126,126
 2410FOR Q%=10 TO 11
 2420PRINT TAB(8,Q%);CHR$141;CHR$129;"
** G O L F **"
 2430PRINT TAB(16,Q%+4);CHR$141;CHR$13
4;"by James McPherson"
 2440NEXT
 2450FOR Q%=1 TO 35
 2460SOUND 1,1,RND(50)+100,2
 2470NEXT
 2480PROCd
 2490FOR Q%=0 TO 1
 2500PRINT TAB(14,Q%);CHR$141;CHR$130;
"G O L F"
 2510NEXT
 2520PRINT ''CHR$129;"  In this game y
ou are a golfer.You are"CHR$129;"given
 a view of the hole from above and"CHR
$129;"a cross section from the tee to
the "'CHR$129;"flag."
 2530PRINT 'CHR$130;"   From this you
have to try and hit"'CHR$130;"the ball
 onto the green. To do this you"CHR$13
0;"must choose the direction in degree
s"'CHR$130;"(0-360 where 0 is straight
 up),and the"
 2540PRINT CHR$130;"club (0-30 where 3
0 is the largest)."
 2550PRINT ''CHR$131;"   Once on the g
reen you must get in";'CHR$131;"the ho
le by a similar method."
 2560PROCd
 2570FOR Q%=0 TO 1
 2580PRINT TAB(14,Q%);CHR$141;CHR$129;
"G O L F"
 2590NEXT
 2600PRINT ''CHR$133;"   You can go ov
er or around trees, but";CHR$133;"if y
ou land in one you loose a shot."
 2610PRINT 'CHR$134;" If you land in t
he rough (BLACK) then"'CHR$(134);"you
have to hit the ball twice as hard";'C
HR$134;"to make it go the same distanc
e."
 2620PRINT ''CHR$131;"  How many holes
```

```
 do you want to play ?";'TAB(14);CHR$1
31;:INPUT "<1-18>",HOLES
 2630IF HOLES<1 OR HOLES>18 THEN VDU7:
GOTO 2620
 2640FOR Q%=18 TO 19
 2650PRINT TAB(8,Q%);CHR$133;CHR$136;C
HR$141;"G O O D  L U C K"
 2660NEXT
 2670PROCd
 2680DIM H(HOLES,1)
 2690ENDPROC
 2700:
 2710:
 2720DEF PROCd
 2730*FX15,0
 2740PRINT TAB(5,23);CHR$132;CHR$136;"
Press any key to continue"
 2750A=GET
 2760SOUND 1,-15,8,3
 2770SOUND 1,-15,32,3
 2780SOUND 1,-15,128,7
 2790CLS
 2800ENDPROC
 2810ENVELOPE 2,1,128,124,120,30,30,30
,127,0,0,-3,126,126:SOUND 2,2,0,75
 2820:
 2830:
 2840DEF PROCdrfarway
 2850GCOL 0,1
 2860MOVE XG%+200,YG%+250
 2870MOVE 16,650
 2880PLOT 85,XG%+200,YG%-85
 2890PLOT 85,16,380
 2900ENDPROC
 2910:
 2920:
 2930DEF PROCscorecard
 2940ENVELOPE 1,3,2,-4,2,20,20,20,127,
0,0,-1,100,100
 2950SOUND 1,1,150,100
 2960PRINT TAB(0,0);CHR$129;"   hole
     yards          shots"
 2970FOR Q%=2 TO HOLES+1
 2980PRINT TAB(4,Q%);CHR$131;Q%-1
 2990PRINT TAB(15,Q%);H((Q%-1),1)
 3000PRINT TAB(29,Q%);H((Q%-1),0)
 3010NEXT
 3020S%=0:L%=0
 3030FOR Q%=1 TO HO%
 3040S%=S%+H(Q%,0)
 3050L%=L%+H(Q%,1)
 3060NEXT
 3070PRINT TAB(0,21);CHR$130;"Total";S
PC(9);L%;SPC(9);S%
 3080PROCd
 3090FOR Q%=10 TO 11
 3100PRINT TAB(3,Q%);CHR$129;CHR$141;"
Do you want another game <Y/N>?"
 3110NEXT
 3120A$=GET$
 3130IF A$="N" THEN CALL&DBBE
 3140IF A$<>"Y" THEN VDU7:GOTO 3090 EL
SE RUN
>
```

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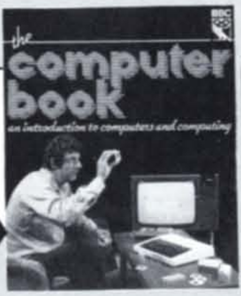
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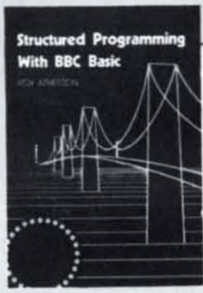
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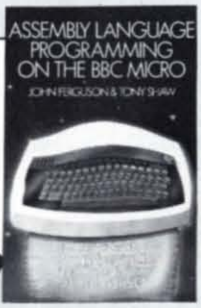
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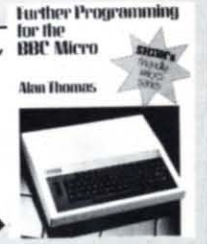
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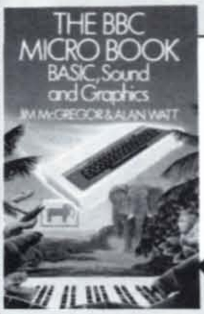
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I must confess I enjoyed R.D. Jackson's arrant nonsense (Micromail, February 1984) for what it was.

I trust that when he buys a car and finds later the manufacturers bring out a facelifted version, he takes his car back to the garage and demands a replacement free of charge on the grounds that his first car was inadequate.

Come off it, Mr Jackson. Surely you realise that the world of microelectronics is changing rapidly.

What is conceived today, manufactured tomorrow, and sold the next day can easily be out of date by next week. Long live progress! – **Richard Grant, Newcastle upon Tyne.**

Chess gambits

REGARDING the article "Chess for Three" in the December 1983 issue of The Micro User. As the author of White Knight, I was pleased to see that Mr Bell gave the "best program" verdict to White Knight.

However there were several errors in the article which I would like you to correct for your readers.

☐ *White Knight is quite capable of doing the KR v K ending on higher levels.*

☐ *White Knight plays the first five moves of the endgame study perfectly and sees the stalemate at move seven.*

If it searched the rook underpromotion it would easily see the win at move six and thus play the whole study perfectly.

It can also understand all draws by repetition perfectly, rather than the crude understanding Mr Bell assumed.

☐ *He concluded from the tests that White Knight and Acornsoft Chess were roughly equal in playing strength. This is ridiculous.*

In a series of games played between the programs on various levels, White Knight beat Acornsoft by 16 games to nil.

This shows White Knight to be at least 700 ELO points stronger, obviously several classes above the others. White Knight also proved itself by winning the home micro section of the '83 European Championships.

Mr Bell should not try to judge playing strength from the results of a few obscure tests. You must play a long series of games to get the overall truth.

☐ *He states that micro programs are still 10 years behind mainframes. The best micros can now play at around 1700-1800 ELO outstripping any mainframe of 1974.*

If it were not for the modern mainframes' phenomenal speed they would be no better than current micro programs. I would like to see any mainframe program play the best micros on similar hardware or with fair handicapping. – **M.P. Bryant, Basingstoke, Hants.**

● My biggest error was to quote White Knight's price without VAT. Taking his points in order:

☐ True, but I only tested at one minute per move.

☐ This is a test repetition, stalemate and underpromotion. White Knight does not consider underpromotion.

Also I do not believe White Knight can "understand all draws by repetition perfectly" because of the overheads involved in matching positions back almost 50 moves when searching ahead, plus whether castling and en passant was relevant.

☐ From the tests the two programs appeared roughly equal.

☐ No chess program without book openings or end game knowledge can be sensibly rated on the ELO scale. If it played against me, then its rating would quickly drop down to mine (which is lousy) and it would have been slaughtered by either Chess 4.0 or Kaissa in 1974 which were rated then at about 1750 against human players.

Also 10 years ago the real skill of chess programming lay partly in getting the very expensive machine time so the mainframe's power was almost completely offset by the fact that the programs were only tested for a few hours and had to be written in high level languages to help understand and debug the errors quickly.

I have responded because I am happy to re-publicise Mr Bryant's excellent program. It was easily the best of the three, but he might be less irate if he read my book "The Machine Plays Chess?" about some of the difficulties which beset the early chess programmers.

In particular consider chapter seven – the story of Cojones, the last word on the subject of the KR v K ending.

A.G. Bell

Barrel Battle upgrade

I THOROUGHLY enjoyed Barrel Battle, the game of the month in your January issue.

However, I find the "super barrel" feature when two barrels land on top of each other and wipe out ladders, didn't give a person of mature years such as myself enough scope – I was always in the wrong place for the incomplete ladders!

So I've modified the codes, as enclosed. It may not be very elegant, but at least it works – and, I think, gives a more enjoyable game! – **Andrew Tormell, Wigan.**

```
   37 R%(I%)=32:IFPOINT(
(A%(I%)+D%(I%))*64+8,(33
-B%(I%))*32-4)=6 OR POIN
T((A%(I%)+D%(I%))*64+8,(
31-B%(I%))*32-4)=6 ORPOI
NT((A%(I%)+D%(I%))*64+8,
(33-B%(I%))*32-16)=7 OR
POINT((A%(I%)+D%(I%))*64
+8,(31-B%(I%))*32-16)=7T
HENR%(I%)=225:T%(I%)=6
```

Top of the pops?

IN the autumn of 1982 Laserbug included a questionnaire in the magazine and accordingly printed the results in the magazine. In the winter of 1983, we carried out a similar questionnaire.

However this year, instead of simply printing the results in the magazine, we thought it would be a nice idea to award the top three answers in suitable categories an award in the form of a certificate.

The categories include, for instance, "Best piece of BBC Micro software". The two categories that are relevant to this letter however are "Favourite BBC Micro magazine" and "Most highly thought of BBC Micro magazine" (the final names of the categories are still to be decided).

Although we will not be releasing the results for a couple of weeks yet, The Micro User has come somewhere in the top three in both categories and hence should receive a cer-

→

MICROMAIL

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tificate.

However the fact that The Micro User refuses to allow ourselves and Beebug to advertise in your magazine for no, as yet, stated reason (despite I note allowing Beebug/Elbug to attend the recent Micro User show?) would point to a possibility of yourselves not accepting the award.

I cannot at this stage be exact, but The Micro User has definitely come somewhere in the top three places in both categories.

I would like to know whether or not The Micro User will be prepared to accept the awards. If so then all well and good, it will be added publicity to your magazine.

If not then by default your awards will go to whoever is in the next position.

I would be grateful if you could inform me whether or not you will be prepared to accept the certificates by Tuesday, February 14. If I do not hear from you by that time I will assume that you are not prepared to accept them. – **Paul Barbour, Editor, Laserbug, Slough.**

Frustrated subscriber

I AM, it would appear, in the unfortunate situation of being a subscriber to the Laserbug user group.

Although, as I understand, you do not accept advertisements from this organisation, there may be many of your readers who are considering joining Laserbug after seeing glamorous claims elsewhere in the computing press.

You may consider it pertinent to advise such readers of my unfortunate experiences as this may flavour their decision.

My 1983 supply of the Laserbug magazine dried up three months prematurely and my 1984 subscription seems to have disappeared into their bank account without producing any return.

Numerous telephone calls and visits to their trading address have, until now, only yielded further frustration and promises of a refund which never materialised.

It was interesting to meet during one visit to their premises some representatives of another organisation also seeking compensation and the reclamation of some expensive equipment.

In the rapidly expanding business of home computing many organisations come and go, the substandard elements gravitating into oblivion in the face of competition from the competent.

As a prominent member of the latter group I trust you will deem fit to warn the unsuspecting of the possible disappointment associated with joining the subject user group. – **K.R. Derbyshire, Wassenaar, Netherlands.**

Bright ideas

I HAVE only had my Beeb for a few weeks and am still ploughing my way through the Basic manual. Obviously not advanced enough to enter the competitions yet!

Do you pay for ideas for competitions? That would be nice! Here are a couple, anyway.

☐ *A competition to invent the best birthday card – flowers growing or what-have-you, with appropriate jingles as well!*

This might appeal to programmers at all levels of expertise and also help to butter up computer widows/widowers on special occasions.

☐ *How about a competition to see who could invent the best competition? Winning entries would, naturally, be used in future issues of The Micro User.*

If you use my second idea perhaps I can submit the first one! – **Julie Switsur, Sydenham.**

● We gave this to the editor, but the last line sent him into an infinite loop, so he can't reply.

Anyway we're always grateful for competition ideas.

Hang on a tick . . .

I AM writing to give you a correction for Hangman which appeared in the December 1983 Electron User. Line 170 should read as follows:

```
170 IF word$=STRING$
     (length%," ")
     THEN PROCwon
     ELSE IF correct%=TRUE
     THEN 80
     ELSE err%=err%+1
     :PROChang
     :IF err%<8
     THEN 80
```

– **B.P. Seddon, Hampton, Middlesex.**

● Quite correct. A number of readers spotted this error. Our apologies.

Not into orbit

IS there a difference between the Electron and the BBC B which has not been mentioned?

I typed in "Electron Orbit" from the January Micro User on my BBC B (1.20 OS Basic I DFS) and got "Division by 0 in line 480".

*This is obvious as in line 470 we are defining X = 500*COS(I%*PI/20) when in 460 we have I% = 0 to 40.*

*As when I% = 10 X = 500COS(10*PI/20) which is 0*

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as COS (PI/2) = 0.

Strangely enough, this doesn't occur at I% = 30 as 30 PI/20 has a slight error and produces a number of the order IE-10*

The cure is:

```
475 IF X=0
    THEN X=1E-10
```

– **Ian Gustard, Westerhope, Newcastle upon Tyne.**

● You've come across one of the differences between Basic I and Basic II – their mathematical routines are handled in different ways.

This is because the ZX81 was found to have better mathematics than Basic I, so Basic II was commissioned.

Thanks!

MANY thanks for your letter, I typed REPORT as you suggested and got Copyright 1982, so I am relieved to know that I have Basic II.

I was tempted to tell you I had Basic III for a moment, but I could not have sustained it!

I tried your suggestion of re-typing the program using 'l' (small L) instead of figure '1' when in doubt, and lo! it worked.

Sorry to have been so stupid – but it really is not very clear, is it? Anyway, I shall not make that particular mistake again.

I am grateful to you for taking the time and trouble to reply to my queries. Good luck with the magazine. – **I.R. Phelps, Peacehaven, East Sussex.**

Character store

I AM taking O level computer studies at school and for my project I am doing a character generator which lets you enlarge characters from ROM and change them with the help of *FX20,1 *and a little assembly in the program.*

When I've changed the characters, I want to save them on disc or tape but don't know how to do this. Can you please help me? – **D. McAllister.**

P.S. *Your London Micro Show was top class.*

● We've yet to read anything which fully explains where the character set is stored after a *FX20,1.

In simple terms the OS states Ascii codes &AO – &BF after a *FX20,1 at the OSHWM or operating system high water mark.

OSHWM is normally set to the value of PAGE, but after this call, PAGE is incremented by 256, that is if PAGE = &E00 then PAGE = &F00.

So all you have to do is Print PAGE and then *SAVE the memory between the normal value of PAGE and its new value.

For example: for OS1.2 tape system PAGE=&E00, after *FX20,1 PAGE=&F00 so *SAVE "CHAR_CODES" E00 EFF and *SAVE "CHAR_CODE2" C00 CFF.

&C00 → &CFF is where the Ascii codes &80-&9F reside, and &E00 → &EFF is where the Ascii codes &A0-&BF reside.

In normal circumstances, or after *FX20,0, &C00 → &CFF contains the Ascii codes &E0 → &FF.

Socket snag

I AM writing to inform your readers of a problem I recently had with my BBC Micro.

While running programs I kept getting spurious inputs from the keyboard.

This only occurred intermittently but when it did happen, it

Strictures on structures

AS a professional systems programmer it saddens me to see yet more letters criticising structured programming from well-meaning people who obviously haven't the faintest idea what structured programming is.

May I attempt to enlighten them?

Structured programming is a program design technique which is based on two separate but related principles.

The first is the idea of a "proper program", which is any section of code having one entry point and one exit point.

A BBC FN, PROC, or even a set of lines which are GOSUBd are all examples of proper programs (unless you want to argue that multiple ENDPROCs or RETURNs are not functionally equivalent to a single exit point).

The second is the structure theorem. This grew from the realisation that the vast majority of program errors arise from a faulty flow of control through the program.

If a set of ground rules for defining program flow could be established it was argued that programs would be easier to design, code, understand and maintain.

And with the bonus that far fewer errors would occur in program flow, and those which did would be much easier to find and correct.

The structure theorem states that any program (in any language, except "parallel" languages such as ADA) can be written using just three forms of construction:

Sequence – *A proper program whose instructions are obeyed in the same order in which they are physically written.*

Selection – *Two or more proper programs, only one of which is executed depending on the result of one or more tests (for example: IF-THEN-ELSE).*

Iteration – *A proper program which is executed a fixed number of times, or a proper program which is executed repeatedly until a condition becomes true, for example: FOR-NEXT, REPEAT-UNTIL.*

No one has yet managed to disprove the structure theorem.

A program designed according to these rules is a structured program. You may design it using flowcharts, pseudocode or anything else.

While I would be the first to admit that structured programming is not essential for all programs, the larger the program the more valuable the technique becomes.

In fact most DP departments insist on the use of structured programming.

What your correspondents are bickering about is not structured programming, but how one physically codes a program, which is hardly the same thing.

For myself, I will stick to meaningfully-named PROCs and FNs which I will probably still understand if I need to amend the program in a year's time.

Preferable to having to find line 8560 to find out what on earth the code there does, particularly since the Renumber command cannot handle 100 per cent of line number references (look up page 336 of the User Guide if you don't believe me).

Incidentally if you follow the structured programming rules you will find that GOTO is not required except in a few rare cases.

In languages such as Pascal, which have definite rules about where you may and may not GOTO, this is just as well.

So please, argue about GOTO and GOSUB if you like, but don't confuse that argument with structured programming! – **Cad Delworth, Edinburgh.**

MICROMAIL

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occurred several times before going away again.

Eventually the fault could be provoked by tapping the upper casing, and I therefore decided to investigate inside.

I found that the multiway ribbon cable between the keyboard and the main PCB was loose at the PCB end.

Accordingly I tried to push it home but found that I couldn't.

On looking closer, I saw that the ribbon cable connector had a moulding on the side.

This moulding was in fact directly over the narrow edge of an adjacent socket, that is on the PCB, thus preventing it from being pushed fully home.

I found that by slightly bending the keyboard ribbon connector assembly away from the socketed IC, I could push the connector fully home.

Since doing this I have not had any further problems. I felt this may be of interest to others who may have experienced similar problems.

It does seem to have been caused by the closeness of the keyboard connection to the socketed IC. – **Peter McKain, Northallerton.**

Game for a cousin

A FEW days ago my little cousin came around, saw the computer, and said: "Can I play a game?"

I didn't think "Swoop" or "Sphinx Adventure" would quite amuse her, so I thought back to my quickest programming techniques and typed in the program listed below. – **Clive Gringras, Cheadle, Stockport.**

```
10 A=RND(2)
20 MODE 7
30 PRINT ''''"IN MY MEMORY
   I HAVE "
32 PRINT "MILLIONS OF
   DIFFERENT OBJECTS"
40 PRINT "I'M THINKING
   OF ONE NOW..."
41 PRINT "CAN YOU GUESS
   IT?"
50 PRINT "ALL YOU HAVE
   TO DO IS ASK A QUESTIO
  N.."
60 PRINT "e.g. CAN IT
   SWIM. I ANSWER YES
   OR NO"
70 PRINT "START TO GUESS"
80 INPUT G$
90 IF G$=""
   THEN PRINT "WELL DONE!"
   : GOTO 150
100 IF A=1 PRINT "YES"
110 IF A=2 PRINT "NO"
120 A=RND(2)
130 GOTO 80
150 PRINT "ANOTHER?"
160 A$=GET$
170 IF A$="N"
    THEN GOTO 180
    ELSE GOTO 70
180 END
```

● This seems such an ideal program for April Fools Day, we can't resist printing it!

And finally, with tongue firmly in cheek . . .

The Archers will never seem the same again

Dear Trev,

Things go from bad to worse. I got home the other night and Andrea dropped a bombshell.

"Don't forget you're being recorded for the BBC tonight".

"What?" I asked, wondering if this meant she'd promised Nigel the loan of my cassette recorder. Again.

"You're being recorded for 'On Your Shoulder' tonight. Dirk, the producer, saw that bit in the paper and rang asking if you'd repeat it on radio. I knew you'd agree, so I said yes for you".

"Why didn't you tell me?" I shrieked.

"I meant to, but you'd have only got nervous. Anyway you ramble on about micros for hours so why should you shut up just when there's a microphone in front of you, recording every word?"

Recording every word. Nervous was an understatement! "On Your Shoulder" is our local radio station's computer program. Every week they tell us about the effect micro chips will have on our futures and wheel on a two-year-old whizz kid.

"What's it about?" I asked.

"Micros", she said helpfully. "You're due there at seven o'clock. You can have your tea when you get back".

I arrived at the studio with five minutes to spare wearing my best suit and with my hair combed. (Andrea's doing. I think she thinks people can see through their radio sets.)

Dirk was there, all jeans, beard and dangling key ring.

"Oh you're the expert", he cried. "Eunice", he yelled to an extremely attractive secretary, "Wally's here".

"It's Bob, not Wally".

"Well, I'm sure you'd know, dear. Come and meet Jock, he's editor of Practically Computing Occasional. You boys will have a lot to talk about".

We walked into the studio and I was introduced to a rather eccentric looking individual who did everything but smoke the pipe he was clasping in the hand he shook mine with.

"Right, let's start, we've not got long, we've got a computer whizz baby coming in next and he's due for a feed".

The red light came on and the questions started.

"Wally", Dirk said, smirking at me, "Why have you squandered so much money on your micro? Isn't it a waste of time and effort?"

I was stunned and could only mumble "Er . . er, er" over and over. Andrea later recorded the thing and told me that she'd counted 15 but she'd erred on the side of sparing my feelings.

I looked at Jock for assistance and he just smiled and finally succeeded in sticking his pipe firmly in his mouth.

"Well it's a hobby", I said lamely.

"Is your marriage breaking up?"

"Not yet", I said, "but wait till I get home".

Dirk smiled grimly and turned to Jock. "Jock, you look like a man who knows what you're talking about. Why did you buy a micro?"

"To use the word processor facility to answer my fan mail with and to keep a database of my recipes".

The pipe went back into his mouth and stayed there firmly while I struggled with questions such as: "Isn't your interest in micros just an obsessional neurosis?" and "Sales of pornographic magazines have dropped as sales of micro mags have increased. What's your explanation, then?"

I staggered out of the studio and went home, too tired to strangle Andrea.

And now I just want to forget it but can't. Andrea keeps calling me Dick Barton and I keep dreaming of Dirk asking me: "Isn't using a micro a very masculine thing?" while Jock smirks on, sucking his pipe.

The Archers will never seem the same.

Yours, **Bob**

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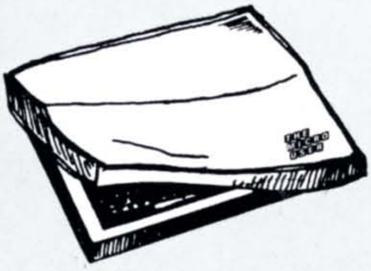

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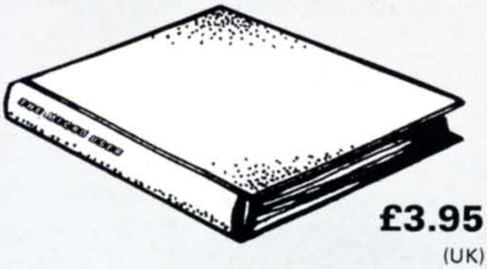

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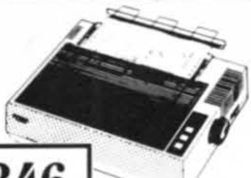

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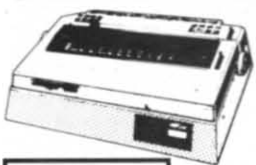

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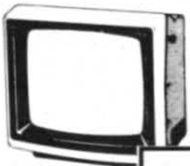

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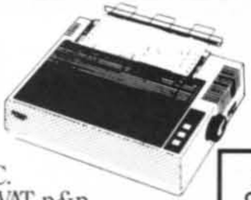

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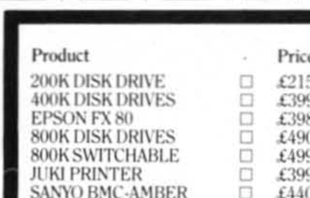

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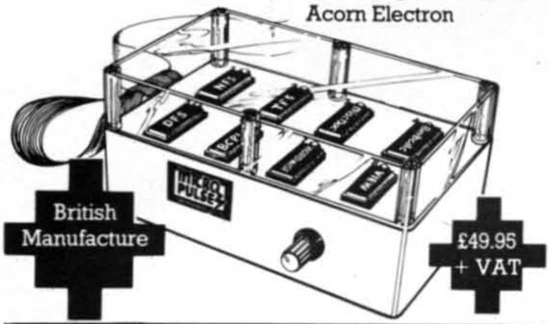

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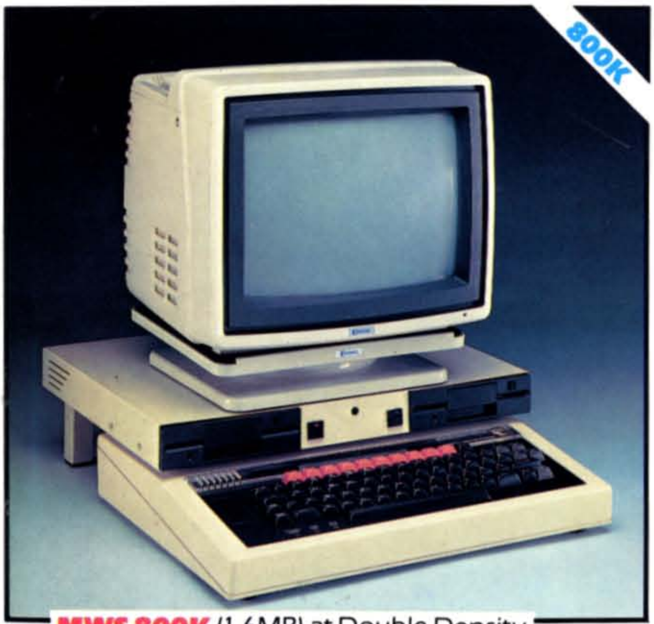

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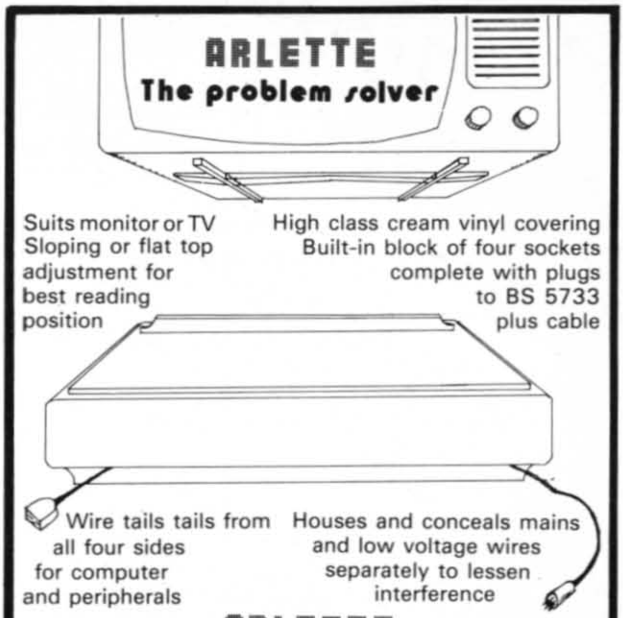

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